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The Chemical Age

VOL LXVII 29 NOVEMBER 1952 No 1742

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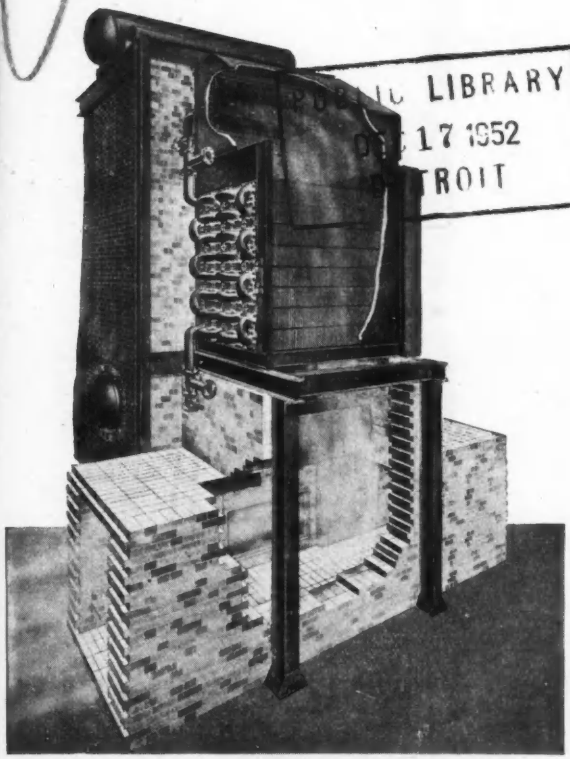

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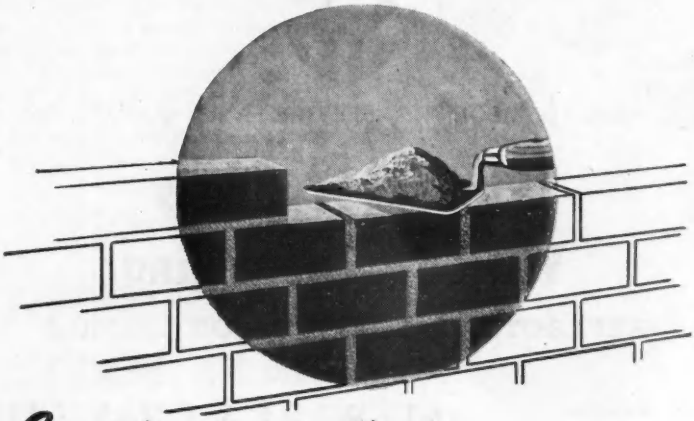

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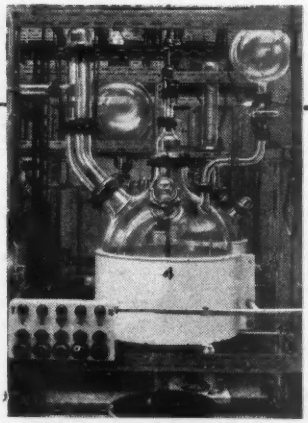

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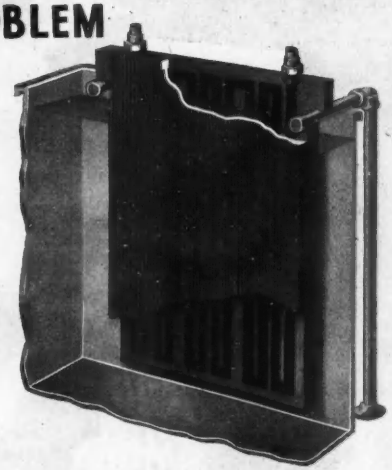

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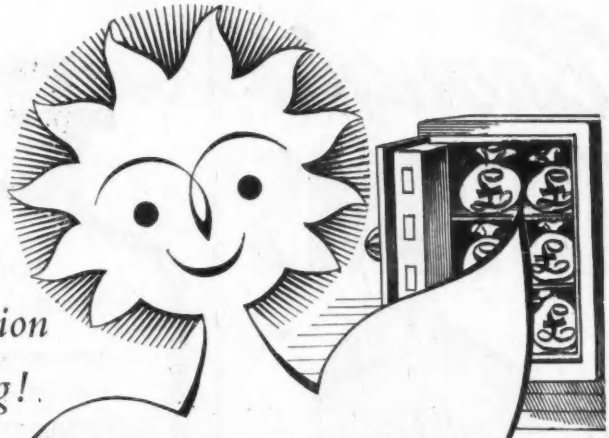

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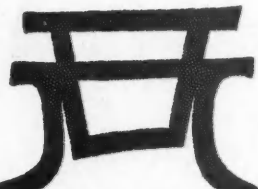

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Volume LXVII 29 November 1952 Number 1742

Chemistry Under Pressure

PERHAPS the most interesting chemical article yet published by *The Times Science Review* (1952, **6**, 2-3) is M. W. Perrin's survey of the chemical effects of high pressure. To assimilate this article is to realise how unaware most chemists are of the influence that external pressure can exert upon rates of reaction and, indeed, upon the practical induction of a reaction. It is commonly enough known that some large-scale reactions are operated under pressure—probably the most notable example of this is the catalytic combination of N_2 and H_2. Here in a difficult reaction high pressure —several hundred atmospheres—pushes the point of equilibrium towards the desired side of the equation due to a decrease in gaseous volume. But this is a simple and well-worn case. We suspect that quite a large number of chemists assume that the chemical effects of pressure are mainly of this obvious kind and are developed for optimum yields in most industrial processes where they are likely to operate beneficially. This is now a somewhat obsolete view for pressures not of hundreds of atmospheres but of thousands and tens of thousands are being considered and investigated. Other changes than those of gaseous volume come into the chemical picture. Liquids become more viscous, and materials functioning as solvents change in ionising power. Under high compression there is likely to be a gain in the potential energy of a liquid system and this may help towards the energy needed for activating a reaction. It is even possible that molecular shapes may be distorted, at any rate in the outer orbits of electrons; this type of change might increase the chance of combination when molecules collide.

Pressures of about 500 atmospheres were studied for their chemical effects in the late years of the nineteenth century; by the 'twenties of this century experimental work at pressures up to 1,500 atmospheres had become practicable. British workers entered this field in the 'thirties and research on the reaction rates of ester hydrolysis measured the effects of pressures as high as 12,000 atmospheres. It was found that at this last-mentioned pressure the rate of sodium monochloracetate hydrolysis was 6½ times the rate at atmospheric pressure. However, more striking increases in reaction rate were found with normally slow reactions, e.g., formation of quaternary salts from amines and alkyl halides. In I.C.I. research at Winning-

ton a large number of organic reactions in liquid phase were studied at 3,000 atmospheres pressure. Almost all normally slow reactions were speeded up 5 to 10 times but greater increases were found for polymerisation reactions. It might be thought that these increases in rate are not attractively big enough to cover the cost of pressure creation and maintenance, that research of this kind is academic. But even in the 'thirties it paid a most practical dividend in leading to the discovery of polyethylene or polythene. Though many unsaturated hydrocarbons had been polymerised to form high molecular weight substances, ethylene, simplest of the double-bond hydrocarbons, had resisted all chemical persuasions along this road. The fact that high pressure influenced polymerisation changes so markedly gave the clue —and solid polyethylene was made when ethylene was subjected to pressure in the range of 1,000 atmospheres; the production of this versatile synthetic material is a far more remarkable example of 'pressure chemistry' than the synthetic ammonia process.

Obviously the progress of research in this intriguing field is exceptionally dependent upon the provision of suitable equipment. Not only must such high pressures be safely withstood but—and especially in research—the substances involved in the reactions must be able to be manipulated. Indeed, the conditions that must be met by equipment for high pressure research are likely to be more severe than those which might have to be met in industrial application. The equipment problem is intensified if one of the reactants is of a corrosive nature for vessels must resist this as well as physical force. A further article in *The Times Science Review* on the techniques of high pressure chemistry is promised. However, it is only too clear from the research progress already accomplished that designers and makers of special equipment have made a notable and difficult contribution.

Should we be at all surprised that many organic reactions are accelerated or made possible when these high pressures are applied? A natural example of chemical changes under the influence of pressure is surely that of oil formation from organic matter imprisoned deep in the Earth. We cannot imitate these molecular transformations by ordinary chemical processes. Even if this comparison is complicated by the vast difference between geological time and ordinary laboratory time, the pressure to which rock-enclosed organic matter must be subjected during decomposition remains a fact of certainty rather than of assumption. Clearly enough there are bacteria and other organisms that can thrive under high pressures. Recently sulphate-reducing bacteria were isolated from a depth of 9,000 feet and it was found that their greatest activity was shown at a pressure of 5,000 lb./sq. inch. Complex chemistry has been going on under high pressure all through the world's history. We have been finding out a little about it for only 60 years.

On Other Pages

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Notes & Comments

Canada's Chief By-Product

As Canada produces more than half the world's newsprint, the spent liquor from the sulphite process represents one of the largest national 'wastes' in contemporary existence. Something like 50 per cent of the dry matter of the raw wood used passes into the spent liquor during the initial cooking process. Converting this material into useful products has long been a tough chemical problem, indeed, a complex of several problems. As Egon Glesinger wrote in his notable book on wood, lignin is the enigmatic key to the future. It is stimulating to learn that Canada is making good progress in developing lignin products from her embarrassing abundance of spent sulphite liquor. A paper by S. R. P. Annett, read in the autumn in Quebec, has recently been published (*Canadian Chemical Processing*, 1952, October, 84) and it shows that the most varied and interesting efforts are being made to bring together lignin possibilities and industrial requirements. Much of the work seems to be on speculative, trial-and-error lines but it is nevertheless developing markets for lignin products. It seems doubtful whether there is any other material so heavily produced about which so little fundamental chemical knowledge has accumulated.

A Major Investment

ONE by-product which has developed a range of industrial uses is calcium lignosulphonate. Tests of this substance as a foundry core binder were officially conducted though it has in fact been used as such for some years. As a result of these investigations it was found that ammonium and sodium lignosulphonates produced five times the dry tensile strength as the calcium salt. This opens up a much wider field for there are many demands for cheap materials that exercise a binding function and where the calcium compound has not in the past succeeded the ammonium or sodium lignosulphonates may break through. Lignosulphonates reduce slurry viscosities and it is now being studied whether this same property will increase grinding efficiencies in mining operations. In a country where mining has become so predominant a part of total industry, success here would bring more than the utilisation of waste. These, of course, are just a token selection of the attempts now being made to establish lignin derivatives. Forty per cent of the developed lignin products of one organisation in Canada are being exported to the United States despite the handicap of a small tariff. It seems to us that Canada has a major scientific investment on her doorstep—the creation of a research centre whose sole aim would be to elucidate the fundamental chemistry of wood lignins. At present 3,000,000 tons of waste sulphite liquor are disposed of as a nuisance every year.

Long Distance Travels

TRIPS to Mars or the moon are not taken seriously merely by small boys or escapist adult readers of the so-called science fiction magazines. No journal is more technically serious than that of the British Interplanetary Society whose 1952 Report publishes in full or in abstract 22 papers read at the Stuttgart meeting of the International Astronautical Congress. One paper dealt with the legal problems involved in space-flight! The opening sentence of a paper by a British member was: 'Interplanetary flight is not only technically possible but certain to be achieved within the next quarter-century.' Let us hope that the planet first visited has more to offer our 20th century civilisation than we have to offer it! But let there be no idle criticism or cynicism—these interplanetary enthusiasts are taking their ideas seriously and developing them scientifically, and chemicals must play an important part in any space-flight project. The suitable high-energy rocket propellent is essentially a chemical development problem. A British survey of possible substances mentions liquid oxygen, liquid ozone, fluorine, chlorine trifluoride, fluorine monoxide, and nitrogen tetroxide as

oxidants; and liquid hydrogen, liquid ammonia, hydrazine, methane, lithium, and beryllium as fuels. It is suggested that a daily Earth-to-satellite supply trip would require something like 1,000 tons per day of propellent combination. To achieve this supply of fluorine, for example, would require the doubling of world production of fluorspar. From this point of view the most hopeful materials would seem to be those whose production can be based upon atmospheric plenty—liquid oxygen and ozone, or nitrogen tetroxide. An Austrian paper mentions diborane in addition to these other propellent chemicals. Difficult chemical demands would also be made for combustion chamber construction—the usual list of semi-scarce or scarce metals is given, titanium, niobium, tantalum, vanadium, zirconium, etc. The huge costs of interplanetary flight must make more insular inhabitants of the world feel that these projects can never materialise. But the argument presented in one of the British papers suggests that total cost is unlikely to exceed sums now spent upon military projects. 'With the construction of the lunar base, production of propellents on the moon itself, and the bringing back of cargoes to the Earth, space travel will become cheaper.' To those who wonder if local inhabitants might object, a German paper offers consolation—human life is believed to be possible only on the Earth. Mars may perhaps support primitive vegetation, and only Venus in a few million years' time will be able to support higher forms of organic life. However, this does not seem quite so consoling for those who venture forth on the first mission of discovery and exploitation.

Prize Essay Competition

AWARDS of £100 and £50 to encourage the writing of papers at a standard suitable for assimilation by a non-specialist reader having some general scientific knowledge are being offered by the publishers of *Research*.

The competition has been organised to encourage research workers both in academic life and industry to appreciate the industrial significance of new discoveries and to exercise their ability in expressing their ideas at a policy-forming level. Competitors are required to write an essay on any recent scientific investigation (whether their own or not), and its potential application in industry.

Papers which should be about 3,000 words in length, should be written in a manner which will enable an intelligent reader with a general scientific interest to appreciate the argument.

Entries, which will be judged by a committee to be appointed by the Scientific Advisory Board, should reach the offices of *Research*, 4, 5, 6 Bell Yard, London, W.C.2, on or before 30 April, 1953. Entries will be accepted only from persons actively engaged on research work in industry, Government or university laboratories.

Further details may be obtained on request from the offices of *Research*.

New Yeast Product

VITA-YEAST, a palatable form of brewer's yeast prepared by Irving's Yeast-Vite, Ltd., was introduced to Press representatives at a conference held in Fleet Street on 19 November. Vita-Yeast is pure dried brewer's yeast with the bitter hop residue removed and then fortified with synthetic vitamins. It is said to be the result of years of research in Irving's laboratories.

By the addition of liberal quantities of vitamins B_1, B_2 and nicotinamide the deficiency of vitamin content of the product has been brought into line with the Ministry of Food standards for foods which claim to be extra-dietary supplements. It is claimed that each ounce of Vita-Yeast includes:—aneurin 3.0 mgm., riboflavine 5.4 mgm., nicotinamide 36.0 mgm., calcium 60.0 mgm., phosphorus 585.0 mgm., proteins 13.2 gm., as well as pyridoxine, folic acid, inositol, biotin, choline, and *para*aminobenzoic acid.

Canadian Uranium Find

Discovery of uranium on a site near Dion Lake, close to Herb Lake, Manitoba, has been confirmed by the Federal and provincial mines departments. The extent of the strike is not yet known.

Gas Engineers' Annual Meeting

Technical & Research Progress Reviewed

DISPOSAL of effluents and safety in gas works are problems of vital concern to the gas industry and special reference to its work in this connection was made in the 13th report, covering the period 1951-52, of the Chairmen's Technical Committee of the Institution of Gas Engineers.

The report was submitted by the chairman, Mr. J. H. Dyde, at the 18th autumn research meeting of the institution held in London on 25 and 26 November.

During the period under review (it was reported) the Chairmen's Technical Committee had continued to co-ordinate the technical work of the institution and to collaborate with other kindred organisations. Close liaison had been maintained with many Government Departments, while co-operation had been continued with the Parliamentary and Scientific Committee, the Joint Committee on Materials and their Testing, of which the institution was a founder member, and the British Standards Institution.

Information on education and training in the gas industry and the disposal of gas works effluents had been collated from the U.S.A. and a number of European countries, and the results presented at the 5th International Gas Conference held in Brussels in June, 1952.

Technical conferences at which the institution had been officially represented during the year included: The London Groups Joint Accident Prevention Conference in London in February; the Health Congress of the Royal Sanitary Institute at Margate in April; the Chemical Works' Safety Conference under the auspices of the ABCM at Buxton in May; the annual conference of the Institution of Fire Engineers, Blackpool, in July; and the 19th annual conference of the National Smoke Abatement Society at Portsmouth in September.

Codes of Practice Revised

Drafting panels had met during the year to revise the codes of practice relating to the installation and utilisation of gas in buildings to incorporate reference to recent developments.

Rapid expansion of certain industries in recent years, and the tendency to concentrate production in large central units, had brought into increasing prominence the inherent problems of the disposal of trade wastes and effluents and of the prevention of river pollution.

Gas Works Effluents

During the past year the Gas Works Effluents Committee had received and dealt with a considerable number of requests for advice in connection with negotiations between local authorities and gas undertakings for the disposal of gas works effluents in admixture with sewage.

Conditions suggested by the local authorities for the acceptance of such effluents into their sewers, whether in regard to the quality of the effluent or to the charges to be paid, varied widely and were sometimes unduly onerous.

By collating information on these points from all over the country, the committee was able to give advice as to the reasonableness of these conditions to which, with the present lack of precise knowledge of the mechanism of biochemical purification, no rigid yardstick could be applied.

Consideration had also been given by the Gas Works Effluents Committee to matters arising in consequence of the operation of the Rivers (Prevention of Pollution) Act, which became effective in August, 1951, including the preparation of by-laws by local committees.

Representation upon local committees charged with the preparation of by-laws relating to the disposal of trade effluent was clearly a matter for the Area Gas Boards concerned, but it was suggested that co-ordination in such matters was highly desirable, and the Gas Works Effluents Committee had accordingly offered its services to the Gas Council in this connection.

The committee was responsible for the preparation of a report on the Disposal of Gas Works Effluents, in which information supplied by the member countries of the International Gas Union, in response to a questionnaire drawn up by the Committee, was collated.

The report pointed out that while in this country there are several new laws designed

to protect the waterways from pollution, and the same position might arise in Belgium and possibly in France, elsewhere such legislation as existed was not very effective, nor were there any legal standards of quality. Dephenolation plants were rare.

It would appear that at the present time the final purification of nearly all gas liquor which was not discharged untreated to waterways or to the land was by means of biochemical oxidation in presence of sewage at sewage works.

Safety Rules Committee

The Gas Works Safety Rules Committee had met regularly throughout the year, its main activities having been directed towards the preparation of further safety codes and the consideration of the reports of accidents which had been submitted by the Area Gas Boards from time to time.

Appendix 2 of Supplement 1 of the 12th Report of the Chairmen's Technical Committee (*Communication* 391) related to the purging of plant by means of liquid carbon dioxide from bottles. Attention was paid to the whole question of purging in the Code of Practice for the Safe Opening of Gas Works Plant which formed the supplement, but no reference was made to the use of steam as a purging agent.

Considerable thought had been given to this matter, particularly since it was used with success for certain of the smaller types of plant by a number of undertakings, and, as a result of its deliberations, the committee had prepared a note on the subject which had been approved by the council and now appeared as a supplement to the present report, under the title: 'Notes on the Use and Limitations of Steam as a Purging Medium.' The title had been chosen with a view to drawing attention not only to the fact that in certain circumstances steam can be used as a purging medium, but also to the limitations of its use, for in other circumstances steam purging could be both highly undesirable and dangerous.

Work was still in progress on a Code of Practice for the Safe Operation of Tower Purifiers, and it was hoped to have this available for general circulation soon. The committee also proposed to consider in the near future some recommendations in regard to the operation of water gas plant and to the handling of butane gas.

Examples of a number of accidents which had occurred during the past few years had been collected together and would be issued shortly as a separate brochure entitled: 'Unusual Incidents at Gas Works and their Lessons' (Part I).

A report, entitled 'Safety Regulations Concerning the High-pressure Storage of Gas,' was presented by the Vereeniging van Gasfabrikanten in Nederland, at the 5th International Gas Conference, held in Brussels in June, 1952. The Gas Works Safety Rules Committee was responsible for the collation of information contained in this report so far as it related to Great Britain.

Work referred to in the 11th and 12th Reports of the Chairmen's Technical Committee on the internal protection of gas pipes had been continued, and consideration had been given to the practicability of internal coating of service pipes with red lead paint or linseed oil at the factory. The experiments had now been completed, and a detailed report was being prepared for submission to the Council.

Palladium Chloride Indicator

A review had been made of the recommendation contained in the 1st Report of the Pipes Committee (*Communication* 170; *Trans. Inst. Gas Eng.*, 1937-38) for the use of the Post Office palladium chloride indicator for detecting the presence of town gas, having regard to the improvements made since that date in methods of detection of carbon monoxide, and in particular the use of silica gel tubes containing palladium salts, as referred to in Leaflet No. 7 ('Carbon Monoxide') of the series of Methods for the Detection of Toxic Gases in Industry, issued by the Department of Scientific and Industrial Research.

Although the latter method was more precise, it was considered that the Post Office palladium chloride indicator was easier for use by semi-skilled workers, and was sufficiently sensitive for most practical purposes. The committee had agreed to recommend that the use of this apparatus should be continued subject to the apparatus using silica gel tubes being available for special checks in doubtful cases.

A number of interesting papers were presented and discussed during the two days of meeting, from which the following summaries have been taken.

'Sampling and Quality Control' was the subject chosen for his paper (*Research Com-*

munication GC.5) by E. H. M. Badger, B.A., M.Inst.Gas E., F.R.I.C. (London Research Station, The Gas Council). The principles underlying the use of quality control charts were discussed.

A scheme was suggested for the sampling of silica refractories, which was based on the degree of variability found in practice. The tolerance limit for the mean density of the samples could be raised if the size of the sample was increased.

An account was given of recent work on the sampling of coal carried out for the British Standards Institution. It was concluded that the ash in coal was distributed in a way that at present could not be predicted. A description was given of the method of duplicate sampling by which the accuracy could be measured and by which under-sampling or over-sampling could be avoided.

Mathematics in the paper were kept to a minimum, and the argument could be followed once the meanings of 'Variance' and 'Standard Deviation' had been grasped.

Methods of assessing the significance of differences between the results obtained by different laboratories were discussed and were illustrated by a description of tests on the reheating of firebricks.

Joint Refractories Committee

The 43rd report of the Joint Refractories Committee was presented as *Research Communication* GC.6. As in previous years detailed consideration was given to three main research items, while nine other investigations of interest to the gas industry were summarised at the end of the report. All the work carried out had been conducted on behalf of the gas industry by the staff of the British Ceramic Research Association, under its director, Dr. A. T. Green.

The first investigation to be described was part III of the long-term project on the relationship between carbon deposition and the incidence of flaking. At the same time, however, the opportunity had been taken of summarising the present outlook regarding flaking by considering the important features that had appeared in the previous two parts.

It was considered that flaking caused by differential expansion was most likely to occur during the scurfing period, and it was therefore suggested that sudden temperature rises during the scurfing should be avoided as far as possible.

Another approach to the problem was to use a refractory material in the flaking zone with a reversible thermal expansion coefficient similar to that of scurf. The two most promising materials from this angle were sillimanite and high alumina refractories. Arrangements were now in hand to build panels of these materials into the flaking zones of continuous vertical retorts.

Silica Brick Texture

Texture of silica bricks was the subject of the second investigation. This was prompted by an examination of French vertical retort installations when it was found that the incidence of flaking was apparently lower than in British retorts and that the silica bricks used in installations in France had a lower porosity and permeability than comparable carbonising refractories in Britain.

There was an ever-widening belief that the porosities and permeabilities of all types of refractories used in carbonising plant (excluding insulating products) could be reduced with advantage to their performance. Conclusions at present must be regarded as merely showing a trend, as the investigation so far had been confined to only nine types of quartzite rock.

Within these limitations, however, it appeared that the texture of the lump silica rock was not a reliable guide to that acquired by the fire brick, since the intrinsic porosities of all the rocks were decreased, and with certain rocks virtually eliminated, during the crushing and grinding of the briquette batch.

The third investigation to be given detailed consideration was concerned with changes in thermal conductivity that might be expected to occur in refractory materials during service. For some years now, the paucity of exact data on thermal conductivity, particularly at high mean temperatures, has been emphasised, but obviously, if the thermal conductivity alters appreciably during use, such data obtained on the unused materials might be seriously misleading to the constructional engineers.

Determination of the change in conductivity that might be expected to occur with a range of refractory materials during service was accordingly considered of sufficient importance to warrant an exploratory investigation.

Difficulties encountered were sometimes formidable and, obviously, certain assumptions had often to be made, in particular the

value of the thermal conductivity of the materials before use. However, the trend of the results was important and reassuring, for with silica and fireclay refractories, provided that gross contamination with slags, metal or dusts was avoided, the thermal conductivity values did not appear to be greatly changed during use. This was the conclusion from a study of silica bricks and fireclay insulating bricks from the flues of a gas retort setting heated with town gas.

Conductivity Doubled

On the other hand, a firebrick from a blast furnace hearth, where metal had penetrated the pores, showed an increase in conductivity of between double and treble that of the unused material, while a diatomite insulating brick that had been subjected to a slightly higher working temperature than was recommended for this type of material showed an increase in conductivity of about 50 per cent.

With insulating products used under clean conditions and at temperatures below their safe maximum, it might reasonably be anticipated that the increase in thermal conductivity would not exceed that of the unused product by more than 10 per cent.

1953 promises to be a busy year for the research investigators, since it is expected that a further two temperatures surveys on vertical retort installations will have been completed by the end of that year.

Oxide Purifiers Performance

'The Performance of Oxide Purifiers' was the title of the paper (*Research Communication* GC.7), given by L. A. Moignard, M.A., D.Phil., F.R.I.C. (Birmingham Research Station, The Gas Council).

Work described in this report was to establish methods for obtaining a good performance, in respect of hardening, back pressure and gas throughput, in conventional oxide purifiers. Responsibility was undertaken for the control of a six-box set, which was elevated, fully housed and provided with ample mechanical facilities for oxide handling.

Policies adopted were based upon the results of earlier phases of the investigation, namely, (i) a survey of purification practice at several representative works, and (ii) a laboratory study of the causes of hardening. These findings were reviewed in the second section of the paper which was divided into six parts.

Section III gave the principal results of the full-scale work. The main features were that hardening had been minimised to the extent that a 45 in. layer of oxide could be discharged from a 40 by 30 ft. purifier by 12 men in little more than a working day; that the daily throughput of gas containing more than 700 gr. of hydrogen sulphide per 100 cu. ft. had reached 4.35 million cu. ft. for a winter quarter (R ratio = 40), with shorter periods at over 5,000,000 cu. ft. per day; and that back pressure had ceased to be an embarrassment.

These results, together with those of the earlier reports and other indications, had enabled recommendations for purifier operation to be formulated.

A detailed account was given in Section IV.

Importance Demonstrated

In one of the earlier reports, the prime importance of migration, the process whereby sulphur accumulates below the surface of oxide which is fouled and revivified, was demonstrated, disorders of migration being shown to play an important part in hardening.

Laboratory experiments had been carried out on the influence of oxide activity, as controlled by migration, of the oxygen concentration in the gas, of prolonged sulphiding, and of elevated temperatures; these were described in Section V. A significant finding was that, when the oxide used was not allowed to dry, migration ensured sufficient increase in its intrinsic activity to offset damage caused by exposure to high temperatures.

It had, however, been found that high hydrogen sulphide concentrations in the gas were responsible for particular problems in purification, since the temperatures then developed, at high gas throughputs, caused drying and loss of activity if special methods of humidification were not applied.

The Effects of Heat

Section VI presented a detailed quantitative study of the effects of the heat liberated by the reactions, and of unsaturation in the gas streams, as regards gas temperatures and loss of moisture from the oxide. It was shown that dissipation of the reaction heat through the purifier walls was fundamental in determining the performance of the set.

Vulcanising Thick Sheets of Rubber

Institution of Chemical Engineers Hear Paper

AT a meeting of the North-Western Branch of the Institution of Chemical Engineers held at the College of Technology, Manchester, on 15 November, a paper entitled 'The Vulcanisation of Thick Sheets of Rubber' by E. C. B. Bott, M.Sc., A.R.I.C., A.I.R.I., of the Anchor Chemical Company, Clayton, Manchester, was presented. The following is an extract of that paper:—

Articles of soft rubber are normally vulcanised by heating a mixture of unvulcanised rubber, fillers, accelerator and sulphur at a moderately high temperature for a certain time in a heated mould which heats both sides of the sheet. At the conclusion of the fixed period of time the article is taken from the mould and is allowed to cool to the temperature of its surroundings.

Vulcanisation takes place during each of thre distinct phases.

Phase 1. The unvulcanised mix is heated to a particular temperature.

Phase 2. The mix is maintained at this temperature.

Phase 3. The vulcanised article is removed from the mould and is allowed to cool to the temperature of its surroundings.

Determination of Properties

In Great Britain the properties of the vulcanised mix are usually determined by tests on sheets of rubber, 10 by 10 by 1/10 in., which are vulcanised for various times at a suitable temperature. The best time of vulcanisation is decided by considering the results of the tests. Since rubber is a poor conductor of heat, the properties of sheets 1/10 in. thick differ from those of thicker sheets which are under-vulcanised when they are given the same time of vulcanisation.

This investigation was made in order to determine (1) the extra time necessary to give the major part of a thick sheet the same amount of vulcanisation as a 1/10 in. sheet, and (2) the uniformity of vulcanisation of sheets throughout their thickness.

Qualitative recommendations for a longer period of vulcanisation for thick articles have been made. A quantitative recommendation,[1] obviously obtained from actual practice, for the vulcanisation of a repair in a belt carcass has been given.

The method of investigation, the theory of the method and its application to sheets of 1/10, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 in. are described in this paper.

Amount of Vulcanisation

The amount of vulcanisation given to a sheet of rubber depends upon the temperature, the amount of vulcanisation per unit time and the time of vulcanisation. Phases 1 and 3 of vulcanisation are divided into periods of time which are small compared with the total time of vulcanisation. The amounts of vulcanisation during the whole of phases 1 and 3 are related to the temperatures obtained during the small periods of time; the amount of vulcanisation during any small period of time is the intensity of vulcanisation at the temperature of a fixed plane in the sheet of rubber, multiplied by the length of the period. An average temperature is assumed during the period.

Intensity of vulcanisation at a constant temperature multiplied by the time gives the amount of vulcanisation during phase 2. The whole amount of vulcanisation is obtained for the 1/10 in. sheet and for the thicker sheets at the standard time for the technical cure. The shortages are found and the extra vulcanisation times readily ascertained.

The Schmidt method[2] was used to determine the progressive increases in temperature with time of the sheets of rubber during phase 1 and the progressive decreases during phase 3.

Quantitative results on the problem can be obtained only if the conditions are standardised. The following conditions and assumptions were adopted:

1. The unvulcanised mix is stored at room temperature.
2. The mix is placed in intimate contact with the hot mould, which is kept at the vulcanising temperature.
3. The temperature of vulcanisation is kept constant.
4. The mix receives all the heat through the faces of the moulds and none through the ends.

5. The length and breadth of the sheet of rubber are large compared with its thickness.

6. The sheet is removed at the exact end of the heating phases.

7. The sheet is hung vertically until it has reached a temperature at which the amount of vulcanisation is negligible.

Theory of the method.—The Schmidt diagram is used for the solution of practical problems of heat conduction in the unsteady state and has been described fully elsewhere,[3] therefore a short description of the theory of Schmidt's method, which is based on Fick's law, will suffice. Schmidt divides a sheet by planes, Δx apart, e.g., a 1/10 in. sheet is divided by 10 imaginary planes 1/100 in. apart.

Fick's law for heat conduction,

$$\frac{\delta T}{\delta t} = \alpha \frac{\delta^2 T}{\delta x^2} \quad \ldots\ldots\ldots\ldots (1)$$

where the temperature varies with both time and distance, is treated as a partial differential equation.

When $\Delta_t T$ represents a small increment of temperature during a small change in time, Δt, x being kept constant, and when $\Delta_x T$ represents a corresponding increment of temperature for a change Δx at constant time,

$$\frac{\Delta_t T}{\Delta t} = \alpha \frac{\Delta_x^2 T}{(\Delta x)^2}$$

or

$$\frac{\Delta_t T}{\Delta_x^2 T} = \alpha \frac{\Delta t}{(\Delta x)^2} \quad \ldots\ldots\ldots\ldots (2)$$

If Δt and Δx are chosen so that the right-hand side of equation on (2) equals $\frac{1}{2}$, then the temperature at any point and at any time on the Schmidt diagram is the arithmetical mean of two temperatures at a distance Δx on either side at a time Δt previously; the required temperature may be determined from the graph by drawing a straight line between the two previous temperatures.

Resistance Negligible

The resistance to the transfer of heat between the mould and the rubber is negligible during phases 1 and 2 because the rubber is in such intimate contact with the mould. Under such conditions the Schmidt method is used for phase 1 and the temperature is calculated arithmetically.

During phase 3 the resistance to the flow of heat from the air is not negligible and the temperature of the surface of the sheet of rubber must be found graphically. A heat balance gives the thermal conditions at the surface of the sheet. The heat conducted to the surface is dissipated into the air. As the slope of the line crossing the surface is $\left(\frac{\delta T}{\delta x}\right)_{x=o}$

$$k \left(\frac{\delta T}{\delta x}\right)_{x=o} = h\,(T_s - T_a)$$

or

$$\left(\frac{\delta T}{\delta x}\right)_{x=o} = \frac{T_s - T_a}{k/h} \quad \ldots\ldots\ldots\ldots (3)$$

Equation (3) gives the slope of the temperature line at the surface and the position of the construction point 0 on the diagram.

To obtain numerical values for the heat transfer coefficients for a sheet in a vertical position, an expression[4]

$$h = 0.275 \left(\frac{T_s - T_a}{L}\right)^{\frac{1}{4}} \quad \ldots\ldots\ldots\ldots (4)$$

which is true for sheets up to 3 ft. high, was used. In the present paper the height of the sheet is assumed to be 10 in., the same as that of the test sheet. The effect of radiation is small and is ignored.

The amount of vulcanisation per period of time is the intensity of vulcanisation at any temperature multiplied by the length of the period of time determined by the Schmidt diagram; it can be obtained at any plane in the rubber. The intensity of vulcanisation has been taken as a function of temperature only and assumed to be independent of time during the period of vulcanisation. It has long been known that the rate of combination of rubber and sulphur at constant temperature does not vary until most of the sulphur has reacted, although accelerators modify this rate. Gordon[5] has recently shown that the reaction is of the first order, at least initially.

Course of the vulcanisation is generally followed by a consideration of some physical property of a vulcanised mix, and the

situation is further complicated because no physical property satisfactorily follows the reaction of rubber and sulphur. Because all conditions are kept similar for the vulcanisation of all sheets which are considered in the examples which follow, it was assumed that the intensity of vulcanisation was independent of time, in conformity with previous workers who had fixed unit intensity of vulcanisation at 240°F. and had obtained the following expression to connect the intensity with temperature,

$$I = 2^{\frac{T-240}{15}}$$

where 2 represents the temperature coefficient =

$$\frac{\text{rate of reaction at } T+15°F.}{\text{rate of reaction at } T\ °F.}$$

This type of equation enables the intensity to be found at any temperature.

Division of the vulcanisation process into three phases and the calculation of the amounts of vulcanisation according to the temperature has enabled a calculation of the vulcanisation time to be made for various thicknesses of soft rubber under certain standard conditions.

The technique of calculating the temperatures for phase 1 by the Schmidt method is easily mastered, and the amounts of vulcanisation obtained in phase 1 for all sheets greater than 1/10 in. thick is greater than in phase 3; for the thickest sheets it is much greater. The accuracy of calculations for phase 3 is less than for phase 1; the thermal conductivity for some common constituents of nearly all mixes is unknown, it has no temperature coefficient, and the system by which it is calculated precludes easy computation of such a coefficient; the heat transfer coefficient has been calculated to a second decimal place which is by no means certain. The temperatures of the edge and the first plane during phase 3 are obtained by a graphical method; this is another disadvantage.

For these reasons the temperature was calculated to the nearest ¼°F. throughout phase 3, and even with such temperature intervals the Schmidt diagrams for the 1/10 and ¼ in. sheets could not be completed because the temperature interval between periods for the edge disappeared after the times shown in the accompanying table, and it is probable that one unit should be added to the desired vulcanisation obtained for the 1/10 in. sheet. The amount of vulcanisation in phases 1 and 3 is small below 160°F.

It has long been known that over-vulcan-

TABLE 1—*Vulcanisation at Various Planes and Extra Time*

Sheet	Phase	Edge V	P^1 V	P^2 V	P^3 V	P^4 V	Centre V	Average V (units)	Shortage V (units)	Extra time (mins)	V at centre (%)
1/10 in.	1	5.720	4.023	3.499	3.235	3.102	3.063	438.3	—	—	0.7
	2	431.88	431.88	431.88	431.88	431.88	431.88				98.5
	3	2.577	2.822	3.027	3.190	3.299	3.348				0.8
		440.177	438.725	438.406	438.305	438.281	438.291				
¼ in.	1	35.75	25.10	21.87	20.22	19.34	19.13	432.7	5.6	0.5	4.4
	2	401.85	401.85	401.85	401.85	401.85	401.85				92.9
	3	6.58	8.18	9.54	10.65	11.45	11.83				2.7
		444.18	435.13	433.26	432.72	432.64	432.81				
½ in.	1	142.98	110.69	87.46	80.99	77.56	76.52	407.0	31.3	3.0	17.5
	2	294.62	294.62	294.62	294.62	294.62	294.62				74.2
	3	13.92	20.08	25.92	30.88	34.82	36.41				8.3
		451.52	425.39	408.00	406.49	407.00	407.55				
¾ in.	1	321.71	226.20	196.77	181.01	172.51	170.19	350.4	87.9	8.0	38.3
	2	115.89	115.89	115.89	115.89	115.89	115.89				46.4
	3	17.94	30.23	41.76	52.79	61.98	64.97				14.8
		455.54	372.32	354.42	349.69	350.38	351.05				
1 in.	1	572.32	402.41	349.93	323.59	310.26	306.15	402.5	35.8	3.27	69.9
	2	—	—	—	—	—	—			12.5	7.6
	3	19.71	39.98	59.45	77.58	91.34	98.43				22.5
		592.03	442.39	409.38	401.17	401.60	404.58			15.77	
										(16)	

isation takes place at the surface of sheets of soft rubber.

Over-vulcanisation at the surface of a 1/10 in. sheet, as shown in the table, is very small, but it increases for thicker sheets until it is quite large for the ¼ and 1 in. sheets. Except for the ¼ and 1 in. sheets this over-vulcanisation does not extend very far beyond plane 1. The uniformity vulcanisation of planes P_2 to the centre in any one sheet is good, and for this reason it was decided to calculate the extra time needed for a full technical cure on the average vulcanisation of planes P_3, P_4 and centre.

A graph shows the great rapidity of the increase in the extra time for the thicker sheets. When the extra time is calculated with greater accuracy than is shown in the table, the extra time is almost, but not quite, directly proportional to the square of the thickness. A plot of extra time versus thickness will provide a graph from which the extra time may be obtained for any thickness up to 1 in. Any accuracy greater than one minute is not considered of interest to the rubber technologist.

The last column of the table shows the phase vulcanisation at the centre of the sheet expressed as per cent of the desired vulcanisation. These results may be applied to other examples when it is assumed that the per cent vulcanisation obtained during phases 1 and 3 is a function of the thickness of the sheet. The time, temperature and vulcanisation intensity are found for the 1/10 in. sheet and the amount of vulcanisation is calculated. Phase 1 vulcanisation for the sheet of the desired thickness is calculated by the method shown. The per cent vulcanisation for phases 1 and 3 from the last column of the table are plotted against the thickness. Phase vulcanisations are taken from the curve and used to calculate phase 3 vulcanisation. Phase 2 vulcanisation and the shortage are ascertained and the extra time easily calculated.

Nomenclature

All properties relate to the rubber mix except where otherwise stated.

α = coefficient of thermal diffusivity = $\frac{k}{s\rho}$ (sq. in./min.).

k = coefficient of thermal conductivity (B.T.U. ft./sq. ft. hr. °F.).

s = specific heat.

ρ = density (lb./cu. ft.).

T = temperature (°F.).

t = time (seconds).

x = distance from one face of the sheet (ft.).

h = coefficient of heat transmission (B.T.U./sq. ft. hr. °F.).

L = height of sheet (ft.).

I = intensity of vulcanisation (units/min.).

V = amount of vulcanisation (units).

Suffixes

$_s$ = surface or edge.

$_a$ = air.

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Plastics & 'Jargon'

SINCE its comparatively recent development a keen interest in the modern industry of plastics has been shown by the ancient Worshipful Company of Horners. Each year a competition is held for the best design in some form of plastics and the award presented at the annual plastics dinner of the company.

Speaking at this year's dinner held at the Fishmongers' Hall on 17 November, Mr. T. L. Birrell (Halex, Ltd.), drew attention to the problems presented by the technical jargon of the chemist and engineer, and urged the necessity for simpler terms.

Acknowledging the debt of the plastics industry to the abilities of the technicians, Mr. Birrell regretted the use of long and complicated designations.

It was neither reasonable, nor good business, he said, to ask people to swallow such mouthfuls as: Polymethyl methacrylate, cellulose acetate butyrate, and urea formaldehyde. Somehow or other they didn't sound nice or friendly. What would our wives think if we asked them what their tastes were in polyamide stockings, instead of nylons!

Examples existed to guide us. There was confusion in the public mind in the early days of artificial silk, as to what the new material was and what it would and would not do. The adoption of the generic term 'Rayon' had been the first step to real progress and the creation of good public relationships.

Mechanical Engineering Research

MERO Issues its Report for 1951

DESPITE the restrictions on the Government building programme and the disappointing expansion of staff, both of which combined to slow down drastically the rate of advance, significant progress was made at East Kilbride in 1951 towards bringing the establishment of the Mechanical Engineering Research Organisation into being.

A survey of the progress during the year is given in 'Mechanical Engineering Research, 1951,' containing the report of the Mechanical Engineering Research Board with the report of the director of Mechanical Engineering Research, Dr. D. G. Sopwith, published last week for the Department of Scientific and Industrial Research (HMSO 2s.).

It is planned to create an organisation with a total staff of 600/700 comprising seven divisions as follows: A, Properties and Strength of Materials; B, Mechanics of Solids, Stress Analysis and Vibration; C, Mechanics of Fluids including Hydraulic Machinery; D, Lubrication, Wear and Corrosion; E, Mechanisms and Engineering Metrology; F, Mechanics of Formation and Machine Shaping of Materials; G, Heat Transfer and Applied Thermodynamics.

By the end of the 12 months under review three new buildings had been occupied at East Kilbridge. These were the central workshop, the staff restaurant and the properties of materials laboratory. The laboratory was at present being used for experimental work on materials, mechanics of solids, fluid flow, heat transfer and mechanics of formation, while parts of the workshop and staff restaurant were given over to work on metrology and mechanisms respectively.

End of Division

With the transfer to Scotland of a large part of the staff and equipment of the Engineering Division of the National Physical Laboratory, the division as such has ceased to exist, though the work on the mechanical properties of materials at high temperatures (creep) would remain at the NPL until a special building could be erected on the Scottish site.

Building of the new hydraulic machinery laboratory, due to be finished in January 1954, had been begun, and it was hoped that work on the heat transfer laboratory would soon be started.

The various moves had seriously impeded the research work, particularly of those divisions which had been or were to be transferred from the National Physical Laboratory. Shortly, however, work should proceed on a limited scale without further interruption.

Importance to Rearmament

Mechanical engineering enters into almost every phase of production and is of essential importance in all industries concerned with rearmament. The board had considered during the year the part that the organisation could play in the present national effort. It was intended at its formation that the organisation should in the main be concerned with basic and generic work of wide general importance. This might not yield immediate results, but it brought its return in a better understanding of how to apply scientific knowledge and it provided a foundation on which practising engineers could build.

Although formulated on this basis, the programme, when subjected to a careful independent survey, had proved to be of high importance under the changed conditions of the present emergency. By wise planning the director was also finding it possible to include certain carefully selected shorter-range researches directed to immediate needs and to adjust the priority of certain longer-range items without serious interference with the original plan except that imposed by limitations in staff and equipment.

A comparatively new high-strength magnesium-zirconium alloy sheet was being tested under repeated tension to determine the basic fatigue properties of the material; in addition tests on welded, riveted, and drilled sheets were in progress. Results so far obtained were extremely promising.

The bulk of the work on gas cylinders and containers had been carried out, as in previous years, at the request of H.M. Chief Inspector of Explosives, Home Office.

The Metallurgy Division, National Physical Laboratory, had collaborated where necessary by carrying out metallurgical and chemical examinations.

Fragments of two cylinders burst in accidents had been examined; four investigations had been carried out on cylinders which had already been in use; tests on both new and used light-alloy cylinders were being undertaken in order to provide basic information for the Home Office Gas Cylinders and Containers Committee (1946); and further samples of light-alloy cylinders of foreign manufacture were undergoing 'type' tests.

New Rust Inhibitor

Investigations by the Lubrication Division at Thornton Hall on the proposal to use sodium nitrite as a rust inhibitor were continuing and experiments by the Water Pollution Research Laboratory on the use of kieselguhr and other filters were also in progress. The general object of this work was to ensure that water of high photographic clarity could ultimately be available in the laboratory.

Experiments on models of laboratory equipment were carried out primarily at the National Physical Laboratory. One experiment was aimed at ensuring stable operating conditions for the proposed laboratory service pumps: the factors affecting the formation of vortices at the sump suction inlets were studied and a design of submerged wall which eliminated these vortices was satisfactorily evolved.

Much time and thought had been given by the Heat Transfer and Heat Exchange Apparatus Committee to the planning of a programme most likely to lead to results of wide application in mechanical engineering. In doing so they had to bear in mind the delay in the provision of the experimental facilities without which the organisation could not make its peculiar contribution to the study of heat transfer in bridging the gap between fundamental research and industrial applications.

Two programmes had therefore been prepared—one for the immediate future and one for the main work requiring experimental facilities which do not yet exist. The building of the projected new laboratory was of urgent importance since modern developments in mechanical engineering strongly emphasised the need for the study of basic heat transfer problems.

In the meantime a start was to be made in a portion of the General Purposes Building and, by a special arrangement with the University of Glasgow, which had lent some laboratory space, an investigation had continued into the effect of an brupt change in the diameter of a pipe on the transfer of heat to a liquid flowing through it.

Under the guidance of the Thermodynamics Committee, useful progress had been made in the preparation of tables of the thermodynamic properties of gases of importance in engineering practice; the Mathematics Division of the National Physical Laboratory had collaborated in this work. In particular, master tables of the properties of carbon dioxide were almost complete and users' tables would be published shortly.

In order to avoid delay in the use of the results already accumulated for air, carbon dioxide, propane, acetylene, and ammonia, additional copies of the surveys had been prepared and were made available to inquirers.

Publishing Difficulty

Some difficulty had been experienced in publishing these critical surveys in full in the scientific periodicals and plans for publication in book form were in an advanced stage.

In extra-departmental research work on the latent heats of binary mixtures had continued at the Imperial College of Science and Technology, University of London. The programme of work had expanded, and a new apparatus had been constructed to measure the Joule-Thomson coefficients of binary mixtures and thence derive data on latent heats. Tests were being made using pure carbon dioxide, comparing the results with other published data, to verify the correct operation of the apparatus.

At Manchester University the thermodynamics research group had used a new apparatus to measure isothermal enthalpy-pressure coefficients for nitrogen, ethylene and nitrous oxide. Work was proceeding on mixtures of these gases. Phase equilibria for propane-ethane mixtures and carbon dioxide-nitrous oxide mixtures were being studied by a flow method and a dew- and boiling-point method respectively.

Crop Protection as a Health Hazard

Problem of Mammalian Toxicity

THE need for reaching a balanced judgment in considering the toxicity of insecticides and pesticides was emphasised by Dr. J. M. Barnes, director of Toxicology Unit, Medical Research Council, when he delivered a paper 'Crop Protection as a Health Hazard' to a meeting of the Crop Protection Panel of the Agriculture Group of the Society of Chemical Industry held in London on 20 October.

In introducing the lecturer to a well-attended meeting, Dr. R. A. E. Galley, the chairman, pointed out that the Panel was specially fortunate at hearing Dr. Barnes soon after he had completed a world survey of the problem on behalf of the World Health Organisation.

The lecturer reminded his audience of the considerable public concern which had been expressed on this subject. From various sources it had been suggested that insecticides were being applied without reasonable care for the operators, that there should be much stricter safeguards on behalf of consumers of foods and that certain of the more recent substances should be prohibited on the grounds that they were inherently too poisonous.

Views on the subject seemed to vary between wide extremes and a careful consideration of all the available data was desirable.

Hazards Assessment

Dr. Barnes separately considered the hazards to those applying the material and to those, including members of the public, who consume food containing residues. He pointed out that the operational hazard generally was reasonably capable of assessment, for example by comparing the accident rates associated with pesticides with those associated with machinery or other factors. In addition it was normally possible to advise on the precautionary measures necessary under particular conditions of use or, in extreme cases, to decide that a given substance was too dangerous for operators to permit its use at all.

On the other hand the assessment of the importance of residues in foodstuffs was often a very difficult matter. Dr. Barnes emphasised that some investigations on the toxicology to mammals should be carried out on every chemical before it was used in a way which might leave any residues in food.

Difficulty of Tests

Attention was drawn to the difficulties in carrying out tests to assess the importance of small residues ingested over a long period and to the fact that it was not possible to be certain regarding the application of the results of animal experiments to man. However, the speaker felt that official authorities and manufacturers were generally aware of this lack of precision and that methods of use normally included reasonable margins of safety.

In closing, Dr. Barnes stated that some attempt should be made to balance the advantages of newer pesticides against the disadvantages, of which the hazards were very important. As his viewpoint tended to reveal only the latter aspects he sometimes wondered whether some new developments really were advantageous. He hoped that the meeting would throw some light on this question.

In the course of the discussion which followed various speakers pointed out the undoubted advantages from using pesticides although, with the short notice available, no-one seemed prepared to state a considered case. Widely varying views were expressed on the degree to which dangers to operators could be met by instruction and by obtaining the co-operation of the workers themselves.

Dr. Goldblatt felt that workers would take all the necessary precautions when using, for example, the phosphorus insecticides if they were told what the risks were. Mr. Leonard Hill, from his experience as an employer, doubted whether this was sufficient. In this connection Sir Harold Tempany also drew attention to the difficulties encountered when using toxic chemicals among native workers and the lecturer remarked upon certain cases of gross misuse which had come to his knowledge.

More than one speaker felt that insufficient work was being done on the effects of

continued ingestions of small doses of pesticides. The need for better methods for detecting and measuring residues in foods was also mentioned.

In proposing a vote of thanks to the lecturer, Mr. H. K. Smith firstly paid tribute to the co-operative way in which Dr. Barnes had dealt with many queries which had been sent to him in the past. He felt that the lectures and discussion had emphasised the need for better facilities for measuring mamalian toxicity. In conclusion, Mr. Smith stated that the lecturer had succeeded in giving a very balanced picture of the subject which he hoped, in due course, to see in print.

Progress in Germany

A Survey of 75 Years' Activity

CHEMICAL progress in Germany, particularly since the war, is comprehensively surveyed in a special issue of *Chemische Industrie* for October, published in commemoration of the 75th anniversary of the German Chemical Society, which was established in 1877 as the *Verein zur Wahrung der Interessen der Chemischen Industrie*.

The volume comprises some 250 pages of editorial matter dealing with most aspects of the German chemical industry and a further 362 pages of reports by 210 chemical firms on their products and general development. The reports are printed on good quality paper and finely illustrated.

To start the survey the first section on taking stock (Bilanz von 75 Jahren) begins with a discourse by Professor W. A. Menne, president of the German Chemical Society, on chemistry in power politics (*im Kraftfeld der Politik*). Then follow articles on self-government problems; 75 years of association work in the chemical field; tariff policy; total and export trade with particular reference to chemicals.

Research and development are reviewed in the next section which covers inorganic chemical research during the past 75 years; some important discoveries; development of the plastics industry; research in textiles and fibres; pharmaceuticals; and process engineering in Germany.

Of particular interest in connection with the organisation of industrial enterprise is the third section, on basic forces in business undertakings (*Kräfte der Unternehmertums*). This deals mainly with cartels, conventions or international agreements, syndicates and big business with special reference to I.G. Farben—its origin, development, and significance; also its post-war fate and disintegration.

A somewhat different type of vital economic force, though not unrelated to the foregoing, is described and exemplified in the following section on economic driving powers: chemistry as a dynamic factor in economics; coalmining and chemistry; chemistry and the iron and steel industry and in other basic industries.

This informative review concludes with the social aspects, some statistics, a chronological history of chemical developments (from 1877), and some views on the I.G. Farben disbandment as reflected in recent literature. This last contains several hundred references, mainly German, but with a considerable number also of British and American.

Industry & Design

CLOSER co-operation between industry and educational establishments in Glasgow in an attempt to check the drift south to students after they had completed their courses was urged last week at Glasgow by Mr. T. Coughtrie, chairman of Belmos Co., Ltd., when he spoke at a conference of Scottish ironfounders on design policy.

Help in the training and placing in employment of young designers should come from industrialists, declared Mr. Coughtrie, who presided. In his opinion insufficient use was made of those who passed through local training establishments.

In some faculties, he said, there were scholarships which enabled students to pursue research work or travel and broaden their minds, and he thought the ironfounding industry might well take the initiative in establishing such a scheme for the young people in whom they were interested and not wait for the education authorities to institute it.

Professor R. W. Baker, principal of the School of Ceramics at the Royal College of Art, London, spoke on the necessity for training designers and improving design, and Mr. Misha Black, a director of the Design Research Unit, dealt with the relationship which should exist between designer and manufacturer.

The Chemist's Bookshelf

ORGANIC CHEMISTRY. By E. E. Turner and Margaret M. Harris. Longmans, Green & Co., Ltd., London. 1952. Pp. xl + 904. 50s.

As there are several very good books on general organic chemistry already available, any further writings on this subject have to be of an extremely high standard to justify publication. At the outset it may be stated that the publication of this book is justified. By its use it is claimed that any intelligent student can obtain a broad view of organic chemistry from its very foundations to the stage at which he will be capable of deriving information from the reading of original papers. As far as any one book can encompass this aim, this volume is successful and as such is warmly recommended. In addition, because of the particular excellence of certain chapters, the book will be a valuable addition to the library of senior organic chemists.

The rapid progress of organic chemistry, coupled with present-day delays in publication makes the writing of a comprehensive and up-to-date book on this subject an impossible task. The authors have realised this and so instead have attempted to depict on the one hand the broad lines on which organic chemistry has developed and on the other, the topics which are attracting attention at the moment. This latter feature may commit the writers to somewhat radical changes in subsequent editions. They rightly consider the three main branches of organic chemistry to be concerned with molecular configuration, mechanism of reaction, and the constitution of naturally occurring substances. Although these topics have served as the main framework for the book, a wider range of organic chemistry is surveyed. The authors confess that they have been more interested in some parts of their subject than others, and indeed this is obvious since there is some unevenness between chapters. The chapter on vitamins is rather brief and in view of current interest in the chemistry of nucleotides and nucleic acids, their treatment must be considered very sketchy. On the other hand, most of the other chapters on natural products are quite adequate for a book of this type. As would be expected the chapters on stereochemistry are excellent.

A highly commendable feature of the book is the blending of the newer ideas of the mechanisms of organic reactions with the classical descriptions of these reactions. This blending has been achieved most deftly and the amount of emphasis to be placed on the newer ideas has been fairly judged. It is clear, however, that the authors consider that organic chemistry is still in essence an experimental science, a viewpoint to which they give adequate expression throughout the book.

The style of writing is somewhat terse, but this is counteracted by a liberal use of formulae and also by some well chosen diagrams. The book is well printed and on present-day costs is reasonably priced.—W.G.O.

KINGZETT'S CHEMICAL ENCYCLOPÆDIA. Edited by Dr. Ralph K. Strong. 8th edition. London: Baillière, Tindall and Cox. 1952. Pp. xii + 1186. 70s.

The expansion of chemistry advances so rapidly that specialisation becomes increasingly necessary. Whereas it was possible to publish the first seven editions of this work under a sole editor, this is no longer possible. In the present volume, Professor R. K. Strong, who succeeded Kingzett as editor, is joined by a team of nine contributors, each a specialist in his field, about half of them being British and half American. The British personnel and their subjects are: H. J. Bunker, M.A., research department, Barclay & Perkins, Ltd., London (*The Vitamins*); J. W. Hadgraft, chief pharmacist, Royal Free Hospital, London (*Pharmaceutical Chemistry*); R. Edgeworth Johnstone, M.Sc., assistant director of Ordnance

Factories (Explosives), Ministry of Supply (*Chemical Engineering*); and L. K. Sharp, lecturer in pharmaceutical chemistry, the School of Pharmacy, University of London (*Organic Chemistry*).

Two main additions particularly deserve attention. One is the article on nuclear chemistry and radioactivity which, because of the nature of the subject matter, is extensively treated, without affecting separate attention given independently to several smaller but related topics.

The second innovation is the intensive coverage of chemical engineering. In view of the increasing interest in this subject and the high status of chemical engineers in the U.S.A., it is especially noteworthy that the contributor of this section, R. Edgeworth Johnstone, is British. Articles are given on: distillation, evaporation, drying, extraction, filtration, crushing and grinding, gas absorption, sedimentation, elutriation, mixing, separation, refrigeration; on furnaces, pumps, centrifuge, colloid mill; on instrumentation, material and heat balance, heat transfer, film coefficient, fluid dynamics, materials of construction, corrosion; on various equations (Raoult-Dalton, Fanning and Darcy) and the laws of Rittinger, Stokes and Kick.

Ten newly discovered elements have been entered as well as the particles proton, deuteron, neutron, electron, and meson. All together some 700 changes of importance have been made either by extending or revising former articles or by adding new subjects, and a number of new charts, tables and diagrams have been included.

While Kingzett does not pretend to be a substitute for a library, it does, as Sir Robert Robinson points out in his foreword, in many cases supply adequate information, and where necessary refers to the sources of deeper reading. The task of revising such a reference work must, indeed, have been almost overwhelming, and it is good to see that despite the additions the main character of the old Kingzett has been retained.

It is impossible in a work of this size to be completely perfect. The most, however, that it is permissible to question in this edition of Kingzett are a few omissions which are not of very vital importance. The exclusion of substances such as thrombin—although fibrin and gobulin are given—and the pterins—although purines are described—are examples. Lesser omissions which have come to light only after some weeks of using the encyclopedia are 'thixotropic,' 'Dewar flask' (which, although cross-indexed, is not explained), 'Mannich' reaction, 'phthalocyanins,' 'Markownikoff's' rule, 'kephalin,' 'lutidines' and some others. A few printing errors complete the very short list of imperfections, whose brevity will indicate the thoroughness with which the field has been covered by this remarkable book.—J.A.Y.

GENERAL AND INORGANIC CHEMISTRY. Second Edition. By P. J. Durrant. Longmans, Green & Co., Ltd., London. 1952. Pp. x + 671. 21s.

The first edition of this book appeared in 1939 and since then it has proved to be very popular with students reading chemistry for the Higher School Certificate Examination, for Entrance Scholarships to the universities and for Preliminary Medical Examinations. For this new edition much of the book has been re-written. There are extensive modifications of the chapter on the periodic classification, atomic structure and valency, and of the chapters on electrolytes, electrode potential and electrolysis. These revisions bring the text more in accord with present-day views on these subjects.

The properties of the principal elements and their compounds again are considered chiefly in terms of the periodic classification, but the form of the periodic table used is slightly different from that outlined in the first edition, and now the scheme preferred is that drawn up by Professor T. S. Wheeler. The general accounts of the chemistry of the elements in each group have been revised and brought up-to-date and where necessary the specific properties of chemical substances have been corrected to conform with recent information in the chemical literature. Two new chapters on colloids and nuclear chemistry are included. The latter section is a particularly welcome addition and at the level of the book gives a good account of the subject. The range of collected examination questions at the end of the book has been extended, thereby further adding to its value. The author is to be congratulated on these improvements in this new edition and it is obvious that the book will continue to be a firm favourite with senior forms of schools. The price is very reasonable.—W.G.O.

HOME

Chemicals & Overseas Trade

Exports of chemicals, drugs, dyes and colours have attained a steady level in the last few months which was maintained in October with a value of £10,670,457. This showed a slight increase of £53,768 over the previous month, but was nearly £3,000,000 lower than the figure for October, 1951. Total value for the first ten months of this year at £117,420,355 showed little change from the same period of 1951.

Annual Staff Dance

More than 500 members representing 32 branches in Lancashire and Yorkshire attended the annual staff dance of the Bradford Dyers' Association held at the Queen's Hall, Bradford, on 21 November. Among those present were the chairman and joint managing director, Mr. James Ewing, accompanied by Mrs. Ewing and their daughter, and Mr. P. A. Holt, joint managing director, with Mrs. Holt.

Colour Makers' Dinner

The British Colour Makers' Association held its third annual dinner at the May Fair Hotel, London, on Wednesday, 5 November, the retiring chairman of the Association, Mr. V. Watson (Cromford Colour Co., Ltd.) presiding. There were 40 representatives of members of the Association and the principal guest was Mr. H. W. Cremer, C.B.E., president of the Royal Institute of Chemistry.

Sulphur Unsold

Not one lot was sold at an auction at Newton Abbot on 15 November of 60 cwt. of sulphur. The sale attracted only two persons apart from the auctioneer, Mr. K. McCallum, and four assistants. Mr. McCallum said he was able to offer the sulphur for sale only in 56 lb. lots, in order to comply with Board of Trade regulations. A bid of 5s. a lot was increased to 10s., and then the auctioneer withdrew the sulphur, which was stacked in the auction room. It was stated that the ceiling price fixed for it by the Government was £2 11s. 4d. per cwt. Mr. McCallum subsequently stated that he would seek permission from the Board of Trade to dispose of the sulphur in bulk, as he was able to supply something like 80 tons.

Addition to Chemical Range

Anhydrous hydrochloric acid for esterification or other reactions has now been added to its range of products by Leda Chemicals, of Wharf Road, Ponders End. The anhydrous hydrochloric acid is supplied in the form of 20 per cent solutions in ethanol or methanol, or other alcohols if desired.

First British Propane Gas Buoy

The use of propane gas as a fuel for lighting buoys has been experimentally used by the Clyde Lighthouses Trust. Early technical difficulties have been largely overcome and the Trust has now a buoy in use in the river, the actual buoy acting as a container for the propane gas. This buoy is claimed to give a clearer and better light than on gas buoys. Extension and development of the scheme remain to be determined. The Clyde Lighthouses Trust is the first British authority to experiment and use propane fed shipping buoys.

Fumaric Acid Available

For many years now the U.K. has been importing supplies of fumaric acid and succinic acid from the U.S.A. and Europe but last week it was announced that a small plant is now in production in the U.K. and is producing 1 cwt. lots of these acids. Inquiries should be addressed to L. Light & Co., Ltd., Poyle Trading Estate,- Colnbrook, near Slough, Bucks.

Importance of Chemistry

The vital importance of chemical research and its impact on all aspects of modern life were emphasised by Sir Ian Heilbron, chairman of the advisory council of the Department of Scientific and Industrial Research, speaking in Glasgow on 24 November. Sir Ian, whose exhortation was given at the opening of a chemical research laboratory at the Royal Technical College, named after him in honour of his services to science, also stressed the need for establishing a separate department of chemical engineering at colleges and universities. The present facilities. he maintained were quite inadequate, and were no doubt partly the cause of some of the British outstanding discoveries being left to foreigners to develop.

OVERSEAS

I.C.I. Expansion Planned

Imperial Chemical Industries of Australia and New Zealand have announced a £500,000 expansion scheme designed to increase production of insecticides, fungicides and weed killers. It was said that the company hoped that the scheme would help increase Australian food production by £200,000,000 per year.

Newfoundland Salt Find

Newfoundland geologists, it is reported, have discovered an underground brine lake of highly concentrated potassium chloride. Government officials are reluctant to disclose details of the strike, which was discovered while engineers were drilling for salt on the rocky west coast, as its size is at present unknown. It is said, however, that the brine contains approximately five times as much KCl as seawater contains NaCl. This is the second discovery of salt deposits on the Atlantic coast. Earlier in the year a deposit was found near a bed of high quality limestone near Antigonish harbour in Nova Scotia.

Franco-American Plastic Project

Formation of a new jointly-owned French company in association with the Compagnies Réunies des Glaces et Verres Speciaux de la France, has been announced by the Monsanto Chemical Company of St. Louis, U.S.A. The new company, La Société Monsanto-Boussois, S.A., will produce plastic materials including polystyrene moulding compounds, which will be manufactured under processes owned by Monsanto and developed by its Plastics Division at Springfield, Mass. A new plant is to be built at Wingles, near Lens, on a site owned by the French parent company. Operations are scheduled to begin in mid-1953.

Air Pollution Conference

The 1953 conference on air pollution abatement sponsored by the Manufacturing Chemists' Association, Inc., will be held 26 and 27 February at the Hotel Statler, Detroit. The meeting will feature papers and discussions on the technical aspects of air pollution abatement and on regional pollution control problems.

British Process for America

'Autofining,' the catalytic desulphurisation process developed by the Anglo-Iranian Oil Co., Ltd., is now available in the U.S.A. through M. W. Kellogg Company, a subsidiary of Pullman Incorporated. A licensing agreement between the British and American concerns was announced by Warren L. Smith, president of the Kellog Company on 3 November.

New Rayon Textile

Discovery of a new rayon textile produced from cellulose is reported by the French rayon concern Comptoir des Textiles Artificiels. The new fabric can be dyed and washed easily and can be produced in extremely fine elementary strands if required. At present it is produced only in small quantities in a pilot plant and is being subjected to extensive tests. It is said to be entirely different in structure from ordinary rayon.

Technical Research in Norway

Progress of the work carried out under the auspices of the Norwegian Technical Research Council, was reviewed by its director general at the annual meeting held recently in Oslo. Projects included the completion of the radioactive laboratory at the Instiute of Atomic Energy where the production of isotopes has begun; the building of Norway's first gas turbine; and the construction at Blindern, outside Oslo, of a Central Institute for Industrial Research. Speeding up of the extensions planned for the Technical University at Trondheim was urged by the retiring chairman of the Technical Research Council. The teaching staff, he said, should be increased by 50 per cent in the next five years. This would entail increasing the University's budget from £270,000 to £400,000 a year.

Baluchistan Natural Gas Find

A natural gas pool has been discovered in Sui, Dera Bugti, Baluchistan, in the first well drilled there by Pakistan Petroleum, Ltd., according to a report from Karachi. Tests are being made to determine the productivity of the gas accumulation. Drilling for the first test well was begun by the company in the arid Sui desert in October, 1951. A further boring in the same area is planned

Publications & Announcements

A UNIVERSAL liquid packing which, it is claimed, dispenses with the need for rings, washers and supplementary packing, is described by Stanley & Sanders, Ltd., of Hays, Kent, in its leaflet now available. 'Contropol,' as it is called, is supplied in tins and is easy to apply. It is reliable up to 3,000 p.s.i. in water pressure and will withstand temperature from 1,000°C. of heat to 50°C. below freezing point. It is absolutely stable in petrol, benzole, oil, acids and alkalis. Tests prove that 'Contropol' will resist hydrochloric acids up to 100°C. and a 20 per cent solution of sodium hydroxide up to 60°C.

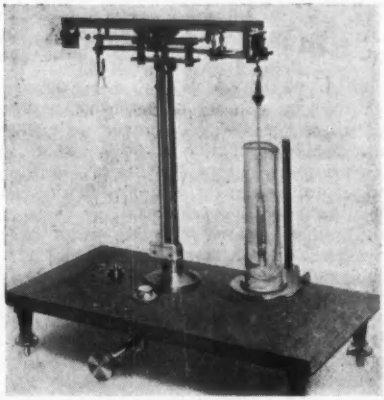
* * *

TWO years of commercial Houdriflow operation are described in the July issue of *Houdry Pioneer*, recently come to hand. The Houdry Process Corporation is this year celebrating the 25th anniversary of the discovery by Eugene Houdry of the basic principles of catalytic cracking which led to the successful commercial adaptation of the process. A reprint of a progress report appearing in *World Petroleum* is being issued by the Corporation reviewing cracking developments over the past quarter of a century. Also available is a pamphlet on recent Houdry developments in catalytic cracking and catalytic reforming which was presented at the 7th National Convention for Methane and Petroleum held at Taormina, Sicily, from 21-24 April this year.

* * *

JOURNALISM today touches life at all points and the collection of articles and stories of 'scoops' secured or chances missed included in this year's 'Inky Way Annual' provides, for the sixth year in succession, a feast of entertainment. Among the long list of contributors to this edition are H. V. Morton, Stanley Bishop, Ian Coster, Guy Eden, Horace Sanders and many others connected with the Press. Illustrations too are provided by a variety of well-known artists and camera-men. Proceeds from the sale of the volume (price 4s. 6d.), go to the Newspaper Press Fund and other Press charities. It is to be hoped that the public will buy and enjoy this book, so that the Press, which gives such generous support to other charities, may on this occasion benefit its own.

ONE of the principal features of a new specific gravity balance of the Westphal type announced by Stanton Instruments, Ltd., London, is that it incorporates an arrestment mechanism with front release, as used in conventional analytical balances.



The instrument has a 10 in. lacquered beam fitted with a separate rider bar with 100 accurate notches, numbered divisions being from zero on the left to 10 on the right. Specific gravities of liquids ranging from 0 to 2.0000 can be determined to an accuracy of 0.0001, with the use of only two riders and one range weight, all of which are made of stainless steel. Knife edges and planes are of selected agate. The instrument has an accurately adjusted plummet and an adjustable platform so that vessels of different shapes and sizes can be used. It is fitted on a base with levelling screws and spirit level, and an outer case can be supplied if required. The balance, which is claimed to be the only one of its kind produced in the U.K., was first shown at the recent International Congress on Analytical Chemistry at Oxford.

* * *

TECHNICAL notes from the Aero Research Company, of Duxford, Cambridge, recently issued in Bulletin 118, contains notes on the direct costs of 'Redux' bonding in aircraft. These are given in shillings, dollars and guilders.

AN industrial catalogue issued by Philips Electrical, Ltd., concerns the whole range of the company's products, which are listed under section headings. The sections include such subjects as arc welding, resistance welding, high frequency heating and so forth. Also recently produced by the company and available to the public are the new, revised arc welding catalogue and special arc welding electrode wall chart. This last gives the range of the company's electrodes and their characteristics.

* * *

NOVA PROIZVODNJA is the title of a Yugoslavian journal to reach us recently (Production News). It contains articles on the chemistry of starch, the work of the Yugoslavian Industrial Research Institute, some problems in the Yugoslavian chemical industry and its development, problems of the leather industry, infra-red spectroscopy, secondary school trained chemists and other subjects. Short summaries in English are given at the end of each article.

* * *

RUBBER LATEX, its uses and methods of processing are given in 'Natural Rubber Latex and Its Applications' recently published by the British Rubber Development Board, Market Buildings, Mark Lane, London, E.C.3. This is the second of a series, and is devoted to latex casting. It is written by C. M. Blow, B.Sc., Ph.D., F.R.I.C., and S. C. Stokes, A.I.R.I., and contains chapters on methods and processes, the production of hollow and solid articles, and colouring. At the end is an abstract of patents.

* * *

INSTRUMENTS and accessories for radioisotope applications are listed in a booklet of this name published by the Scientific Instrument Manufacturers' Association of Great Britain in collaboration with AERE, Harwell. The booklet is edited by Denis Taylor, Ph.D., F.Inst.P., and A. G. Peacock, B.Sc., A.R.I.C., A.Inst.P., and it aims to assist the potential user of radioisotopes in selecting electronic equipment to suit his special needs. Details are given of the various detector elements and associated apparatus used for radioactive assay and radiation monitoring, together with the names and addresses of manufacturers. All items of equipment for common methods of assay are brought together under single headings. The brochure is in its second edition.

A NEW Automatic Controller Catalogue has been published by Negretti and Zambra, Ltd. This contains details of all the controllers made by the company, including temperature, pressure and humidity controllers and their accessories, characteristics, price and performance. The book has over a hundred pages and may be obtained from the company at 122 Regent Street, London.

* * *

IT has recently been discovered that nylon can be processed by sintering techniques. The Polymer Corporation, of America, Box 422, Reading, Pa., has announced the developement of a finely divided nylon powder, produced by a special chemical process which makes it suitable for cold pressing and sintering techniques similar to those practised in powder metallurgy. Since the nylon powder is processed below the melting point, there is less tendency to internal strain in sintered nylon with consequent greater dimensional stability in service. In addition the use of a powder without melting enables uniform blending of nylon with a wide range of fillers for reducing thermal and hygroscopic expansion, or to obtain special electrical properties.

* * *

A HOGGER for hogging, chipping or shredding and applicable to the reduction of fish, fish offal, whale meat and carcases containing bones, is described in a pamphlet issued by Rose, Downs & Thompson, Ltd., Hull. The capacity of the hogger is up to 10 tons per hour. This size is standard, but other sizes can be supplied.

* * *

ONCE AGAIN a detailed technical record of fire fighting equipment available to deal with normal and emergency conflagrations anywhere in the British Isles appears in the 1953 edition of the 'Fire Protection Year Book,' just published by Benn Brothers, Ltd., Bouverie House, 154 Fleet Street, London, E.C.4 (price 12s. 6d. post paid). All the public Fire Brigades are listed, together with the appliances available to deal with any type of fire. Similar records covering fire fighting units wholly maintained by industry and private sources now ready to assist in the new civil defence schemes are also given. The Year Book contains information of interest to all those in industry and the public services who are primarily concerned with the safety of life and property. A diary section is also included.

Next Week's Events

MONDAY 1 DECEMBER

Society of Chemical Industry

London: Burlington House, Piccadilly, W.1, 6.30 p.m. Joint meeting of the Fine Chemicals Group and the London Section with the RIC. G. E. Smith (Stafford Allen & Sons, Ltd.): 'Essential Oils.'

TUESDAY 2 DECEMBER

Institution of Chemical Engineers

Cardiff: University College of South Wales and Monmouth, Cathays Park, 7 p.m. South Wales Centre, Graduates' and Students' Section. Technical film display and discussion (including films on 'Krilium' and 'Oil Fires.').

Hull Chemical & Engineering Society

Hull: Church Institute, Albion Street, 7.30 p.m. Miss J. Binns: 'Technical Libraries—A Justification.'

Institute of Metals

Oxford: Black Hall, St. Giles's, 7 p.m. Dr. D. W. Thomas: 'The Variation of Young's Modulus with Temperature and its Relationship to Recrystallisation'; Dr. N. C. Welsh: 'Electron Micrography'; Dr. P. L. Pratt: 'The Study of Fracture Surfaces.'

Swansea: University College, Singleton Park, 6.30 p.m. R. A. Johnson: 'Synthetic Resin Adhesives for Metals.'

Institution of Works Managers

Loughborough: Saracen's Head. Joint meeting of Leicester, Notts and Derby branches. Dr. G. M. Dyson: 'Research and Management in the Chemical Industry.

WEDNESDAY 3 DECEMBER

The Chemical Society

Belfast: Agriculture Lecture Theatre, Elmwood Avenue, 7.15 p.m. Jubilee Memorial Lecture of the Society of Chemical Industry. Joint meeting with the RIC and Northern Ireland Section, SCI. J. R. Whinfield: 'Textile Fibres—Variations on Some Familiar Themes.'

Society of Chemical Industry

Dublin: University College, 7.45 p.m. Dr. L. H. Lampitt: 'Biochemical Research in the Food Industry.'

Royal Institute of Chemistry

London: South West Essex Technical College, Forest Road, Walthamstow, E.17, 7 p.m. Professor D. H. Hey: 'Developments in the Chemistry of Free Radicals.'

Institution of Chemical Engineers

Smethwick: Visit to glass works of Chance Brothers, Ltd., 2 p.m. Midlands Centre, Graduates' and Students' Section.

Institute of Welding

Manchester: College of Technology, 7.15 p.m. H. E. Dixon (British Welding Research Association): 'Recent Developments in Resistance Welding.'

Society of Public Analysts

London: Burlington House, Piccadilly, W.1, 7 p.m. Dr. H. H. Green (Ministry of Agriculture, Weybridge): 'Industrial Fluorosis.'

London: Sir John Cass College, Jewry Street, E.C.3, 6.30 p.m. Annual general meeting of the Polarographic Discussion Panel of the Physical Methods Group. P. R. D. Pomeroy and R. A. White: 'Modification of the Cambridge Polarograph for Derivative Polarography'; Dr. R. A. White: 'The Polarographic Determination of Cadmium in Aluminium and Some Other Alloys.'

THURSDAY 4 DECEMBER

The Chemical Society

Bangor: University College of North Wales, 5.45 p.m. Joint meeting with RIC. Professor H. J. Emeléus: 'Some Recent Advances in the Chemistry of the Fluorine Compounds.'

Bristol: University, Woodland Road, 6.30 p.m. Joint meeting with the RIC and Chemical Engineering Group, SCI. Dr. H. E. Priston: 'Selection of Lubricants for Industrial Applications.'

Dundee: University College, 5.15 p.m. Lecture by Professor H. W. Melville.

London: Burlington House, Piccadilly, W.1, 7.30 p.m. Reading of original papers.

Society of Chemical Industry

Nottingham: Gas showrooms, 7.15 p.m. Lecture by D. C. Garratt.

Preston: Town Hall, 7.30 p.m. Liverpool Section, joint meeting with the RIC. F. V. Davies: 'Man-made Textile Fibres, their Structure and Behaviour.'

Institution of Chemical Engineers

Bradford: Technical College, Great Horton Road, 7 p.m. Yorkshire Centre, Graduates' and Students' Section. J. E. Bartle: 'An Account of the Factors Affect-

ing the Efficiency of Bubble-Cap Distillation Columns.'

The Royal Institution

London: 21 Albemarle Street, W.1, 5.15 p.m. Third of series of four lectures by Dr. D. H. R. Barton (Reader in Organic Chemistry, Birkbeck College, University of London) on 'The Chemistry of the Steroids.'

Leeds Metallurgical Society

Leeds: University, 7.15 p.m. P. Stables: 'Delayed Fracture in Metals under Static Load.'

FRIDAY 5 DECEMBER

The Chemical Society

Aberdeen: Marischal College, 5.30 p.m. Joint meeting with the RIC and SCI. Dr. H. J. T. Ellingham: 'Chemistry in Higher Technological Education.'

Birmingham: University, Edgbaston, 4.30 p.m. Lecture by B. H. Turpin (Quickfit & Quartz, Ltd.).

Portsmouth: Municipal College, 7 p.m. Professor R. P. Linstead. 'The Transfer of Hydrogen between Organic Compounds.'

Society of Chemical Industry

Glasgow: Royal Technical College, 7.15 p.m. Joint meeting of the Food Group and Oils and Fats Group with the Glasgow Section. J. B. M. Coppock and M. A. Cookson: 'The Rôle of Glycerinated Fats in Baking.'

Plymouth: Technical College, 5.30 p.m. South Western Section. E. Holmes: 'Modern Chemical Methods of Crop Protection.'

The Royal Institution

London: 21 Albemarle Street, W.1, 9 p.m. Dr. F. J. Siddle (director, Dyestuffs Division, Imperial Chemical Industries, Ltd.): 'New Fibres and the Problem of Colouring Them.'

Oil & Colour Chemists' Association

London: Criterion Restaurant, Piccadilly Circus, W.1, 6.45 p.m. Ladies' Night, London Section, annual dinner and dance.

SATURDAY 6 DECEMBER

Society of Leather Trades' Chemists

Manchester: Engineers' Club, Albert Square, 2 p.m. P. S. Briggs: 'Variations of the Course of Chrome Tanning by the Additions of Single and Combined Masking Salts'; G. E. Benskin: 'Some Factors Influencing Tensile and Tear Strength of Split Hide Leather.'

Personal

MR. A. C. BENSON, aged 25 years, of Rawdon, near Leeds, has been appointed assistant research chemist in the grease research department of Bradford Corporation. Mr. Benson, who was educated at Woodhouse Grove School, Apperley Bridge, and Leeds Technical College, is an Associate of the Royal Institute of Chemistry.

MR. J. H. COTTON, deputy treasurer of I.C.I., Ltd., has been appointed treasurer in place of Mr. J. L. Armstrong, whose appointment as finance director was recently announced. Born at Wrexham, Denbighshire, in 1898, Mr. Cotton was awarded a scholarship at St. John's College, Oxford, in 1916, but with the intervention of the war it was 1919 before he was able to take it up. He left St. John's in 1921 after graduating and entered the service of the Inland Revenue where he remained until 1928, when he began his service with I.C.I. in the company's Taxation Department of which he became head a year later. He was appointed deputy chief of the Pensions Department in 1937, head of that department in 1942, and deputy treasurer five years later.

J. H. Cotton

MR. GEORGE CALDER, Second Secretary to the Board of Trade since 1949, has been appointed U.K. Commissioner on the British Phosphate Commission. Mr. Calder, who on this appointment resigned his post of Second Secretary at the Board of Trade, was educated at Edinburgh University and has served in the Air Ministry and the Ministry of Aircraft Production.

Two new Fellows, C. A. COULSON (Oxford) and F. E. HOARE (Leeds) were elected at a meeting of the Institute of Physics on 18 November. Among the 23 new Associates were four from Australia and one from Jamaica. Also elected were 52 graduates, five subscribers and 35 students.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

MASSON, SEELEY & CO., LTD., London S.W., chemical engineers, etc. (M., 29/11/52). 21 October, £50,000 debentures, to Bishopsgate Nominees, Ltd.; general charge. *Nil. 1 May, 1952.

Receivership

The following Receiver and Manager has been appointed:—Sidney B. Allder, of 21 South Lambeth Road, S.W.8, was appointed Receiver and Manager on 31 October, 1952, to Baldwin Chemical Sales, Ltd.

Increase of Capital

The following increase of capital has been announced:—SHELL CHEMICALS DISTRIBUTING CO. OF AFRICA, LTD., from £50,000 to £200,000.

Satisfaction

J. K. INNES & CO., LTD., Carlisle, chemical engineers. (M.S., 29/11/52). Satisfactions, 29 October, of mortgage registered 12 July, 1948, and mortgage and charge registered 8 May, 1950.

New Registrations

Enthoven Solders, Ltd.

In the announcement of the formation of this company (THE CHEMICAL AGE, **67**, 681), the name was incorrectly given as Enthoven Solvents, Ltd. It should, of course, be Enthoven Solders, Ltd., as above.

King Chemical Co., Ltd.

Private company. (513,371). Capital £1,000. Manufacturers of chemicals and chemical products of all kinds. L. E. W. King, A. D. Booth and Wm. C. Allen. Reg. office: 6 Tudor Parade, London Road, Hounslow, Middx.

Company News

Laporte Chemicals Ltd.

An extraordinary meeting of Laporte Chemicals, Ltd., is to be held on Tuesday, 16 December, to seek the approval of shareholders to an increase in the company's borrowing powers from £1,600,000 to £3,500,000. Final decisions as to the form in which the new capital is to be raised will be announced later. As forecast in the chairman's statement at the annual meeting in July, additional capital will soon be required by way of permanent finance for the expansion programme including the new titanium oxide plant of the subsidiary, National Titanium Pigments, Ltd., at Stallingborough, north Lincolnshire.

The Steetley Company Ltd.

Formation of a new company the Steetley of Canada, Ltd., the business of which will be mainly the production and sale in Canada of burned dolomite refractories is announced by The Steetley Co., Ltd. The new company is to have a subscribed capital of $1,250,000 consisting of: 10,000 4½ per cent cumulative redeemable preferred shares of $100 each; 250,000 common shares without nominal or par value which are to be issued at a price of $1 each. The Steetley Co., Ltd., has agreed to subscribe an amount of $1,000,000 in the form of 8,500 preferred shares and 150,000 common shares. Further, arrangements have now been concluded for the underwriting of a public issue in Canada of mortgage bonds of a total nominal amount of $2,500,000.

6,000th Member Admitted

A further milestone in the progress of the Textile Institute was reached on Friday, 21 November, when John P. M. Turner, an 18-year old Derby trainee was admitted as its 6,000th member. At the end of 1945 membership of the institute was 2,369. By December, 1946, there were 3,000 members; the 4,000th mark was passed in April two years later, and a total of 5,000 reached in May, 1950.

British Chemical Prices

LONDON.—There have been very few price changes reported from the chemicals market during the past week and there has also been little alteration in trading. Inquiries from the leading home consuming industries have been on a fair scale and contracts are being steadily drawn against, but the volume of new business actually placed is only moderate although a confident outlook prevails in most sections of the market. Quotations for tartaric acid are 15s. a cwt. cheaper and the chemical compounds of lead have fluctuated within narrow limits. Among the coal tar products there has been a good inquiry for the pyridine, anthracene oils and phenol while the demand for pitch is fully maintained.

MANCHESTER.—Trading conditions on the Manchester chemical market during the past week have been much the same as before, with a fair aggregate movement of contract supplies of a wide range of products to home users. Export movements have also been fairly well maintained. So far as new business is concerned, however, the majority of buyers are not at the moment disposed to commit themselves far ahead and additions to order-books since last report have been only moderate. In basic slag and one or two other sections of the fertiliser market a steady trade is being done.

GLASGOW.—Demand for the general run of industrial chemicals has remained steady throughout the week and movement in other products has been satisfactory although prices have been somewhat unstable. Little change is reported with regard to export.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £106 ; 80% pure, 1 ton, £112 ; commercial glacial 1 ton, £118 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £149 per ton.

Acetone.—Small lots : 5 gal. drums, £145 per ton ; 10 gal. drums, £135 per ton. In 40/50 gal. drums less than 1 ton, £115 per ton ; 1 to 9 tons, £114 per ton ; 10 to 49 tons, to £113 per ton ; 50 tons and over, £112 per ton.

Alcohol, Industrial Absolute.—300,000 gal. lots, d/d. 3s. 7½d. per proof gallon ; 100,000 and less than 200,000 gal. lots, d/d, 3s. 8½d. per proof gal.

Alcohol, Diacetone.—Small lots : 5 gal. drums, £162 per ton ; 10 gal. drums, £172 per ton. In 40/45 gal. drums ; less than 1 ton, £142 per ton ; 1 to 9 tons, £141 per ton ; 10 to 50 tons, £140 per ton ; 50 to 100 tons, £139 per ton ; 100 tons and over, £138 per ton.

Allyl Alcohol.—Less than 40 gals., 3s. 10½d. per lb. ; 40 gal., 3s. 6½d. per lb. ; 2 to 5 40 gal. drums, 3s. 4½d. per lb. ; 1 ton and over, 3s. 2½d. per lb.

Alum.—Ground, £24 per ton, f.o.r. MANCHESTER : Ground, £25.

Aluminium Sulphate.—Ex works, £12 per ton d/d. MANCHESTER : £14 to £15.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £47 per ton.

Ammonium Chloride. — Grey galvanising, £31 5s. per ton, in casks, ex wharf. Fine white 98%, £23 12s. 6d. to £26 5s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER : £6 2s. 6d. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £93 and £91 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots as to grade, etc., 2s. 3½d. to 3s. 1½d. per lb. Crimson, 3s. 4½d. to 4s. 5½d. per lb.

Arsenic.—Per ton, £59 5s. nominal, ex store.

Barium Carbonate.—Precip., d/d ; 2-ton lots, £35 5s. per ton, bag packing.

Barium Chloride.—£44 10s. 2 ton lots d/d bags.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £41 per ton d/d ; 2-ton lots, £41 5s. per ton d/d.

Bleaching Powder.—£21 per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid: Anhydrous, £59 10s. ; in 1-cwt. bags; commercial, granular, £39 10s. ; crystal, £42 ; powder, £43 ; extra fine powder, £44 ; B.P., granular, £48 10s. ; crystal, £51 ; powder, £52 ; extra fine powder £53.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid : Commercial, granular, £68 ; crystal, £76 ; powder, £73 10s. ; extra fine powder, £75 10s. ; B.P., granular, £81 ; crystal, £88 ; powder, £85 10s. ; extra fine powder, £87 10s.

Butyl Acetate BSS.—£202 per ton, in 10-ton lots.

Butyl Alcohol BSS.—£180 per ton, in 10-ton lots.

***sec.* - Butyl Alcohol.**—5 gal. drums £174 ; 40 45 gal drums : less than 1 ton £144 per ton ; 1 to 10 tons £143 per ton ; 100 tons and over £140 per ton.

***tert.* - Butyl Alcohol.**—5 gal. drums £195 10s. per ton ; 40 45 gal. drums : less than 1 ton £175 10s. per ton ; 1 to 5 tons £174 10s. per ton ; 5 to 10 tons, £173 10s. ; 10 tons and over £172 10s.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4-ton lots.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chromic Acid.—2s. 0½d. to 2s. 0¾d. per lb., less 2½%, d/d U.K.

Citric Acid.—1 cwt. lots, 213s. cwt. 5 cwt. lots, 208s. cwt.

Cobalt Oxide.— Black, delivered, 13s. per lb.

Copper Carbonate.—MANCHESTER : 2s. 8d. per lb.

Copper Sulphate.—£97 10s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £11 2s. d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £164 per ton.

Formaldehyde.—£35 10s. per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £82 5s. in 4-ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1.260 S.G. £14 19s. per cwt.
Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hydrochloric Acid.—Spot, 12s. to 16s. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £124 10s. per ton. 35% wt. £153 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 21s. 3d. per lb. in cwt. lots.

Iodoform.—25s. 4d. per lb. in cwt. lots.

Lactic Acid.—Pale tech., 44 per cent by weight £122 per ton ; dark tech., 44 per cent by weight £67 per ton ex works one ton lots ; dark chemical quality 44 per cent by weight £102 per ton, ex works ; Usual container terms.

Lead Acetate.—White : £147 10s. per ton.

Lead Nitrate.—£105 per ton.

Lead, Red.—Basis prices per ton : Genuine dry red lead, £121 ; orange lead, £133. Ground in oil : red, £148 15s., orange, £160 15s.

Lead, White.—Basis prices : Dry English, in 5-cwt. casks, £137 5s. per ton. Ground in oil : English, under 2 tons, £159 10s.

Lime Acetate.—Brown, ton lots, d/d, £30 to £34 per ton ; grey, 80-82%, ton lots, d/d, £34 to £39 per ton.

Litharge.—£121 per ton.

Magnesite.—Calcined, in bags, ex works, £22 to £24.

Magnesium Carbonate.—Light, commercial, d/d, £87 15s. ; cwt. lots £97 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £221 ; cwt. lots £227 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—19s. 3d. per lb. in 28 lb. lots ; smaller quantities dearer.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 6s. 4½d. per gal. ; pyridinised 64° O.P. 100 gal., 6s. 6d. per gal.

Methyl Ethyl Ketone.—5 gal. drums, £183 per ton ; in 40-45 gal. drums, less than 1 ton, £153 per ton ; 50 to 100 tons, £150 per ton ; 100 tons and over, £149 per ton.

Methyl *iso*Butyl Ketone.—5 gal. drums, £213 per ton ; in 40-45 gal. drums, less than 1 ton, £183 per ton ; 50 to 100 tons, £180 per ton ; 100 tons and over, £179 per ton.

Nickel Sulphate.—D/d. buyers U.K. £140 10s. per ton.

Nitric Acid.—£35 to £40 per ton, ex works.

Oxalic Acid.—Home manufacture, £170 per ton ; foreign manufacture, £137 10s. per ton.

Phosphoric Acid.—Technical (S.G. 1.700) ton lots, carriage paid, £87 per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 3½d. per lb.

Potash, Caustic.—Solid, £98 10s. per ton for 1-ton lots ; Liquid, £37 15s.

Potassium Bichromate.—Crystals and granular, 11½d. per lb. ; ground, 1s. 0½d. per lb., standard quantities.

Potassium Carbonate.—Calcined, 98/100%, £116 per ton for 1-ton lots, ex store.

Potassium Chloride.—Industrial, 96%, 6-ton lots, £20 to £22 per ton.

Potassium Iodide.—B.P., 18s. 7d. per lb. in 28 lb. lots ; 18s. 1d. in cwt. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 9½d. per lb. for 1-cwt. lots ; for 3 cwt. and upwards, 1s. 8½d. per lb. ; technical, £9 2s. per cwt. ; for 5 cwt. lots.

***iso*Propyl Alcohol.**—Small lots : 5 gal. drums, £156 per ton ; 10 gal. drums, £146 per ton ; in 40-45 gal. drums : less than 1 ton, £126 per ton ; 1 to 9 tons, £125 per ton ; 10 to 50 tons, £124 per ton ; 50 to 100 tons, £123 per ton ; 100 tons and over, £122 per ton.

Salammoniac.—Dog-tooth crystals, £72 10s. per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid. — MANCHESTER : Technical 2s. 7d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic.—Solid 76/77% ; spot, £23 5s. per ton d/d. (4 ton lots).

Sodium Acetate.—£85 to £91 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £12 7s. 6d. per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 9½d. per lb. ; anhydrous, 11½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£87 to £95 per ton.

Sodium Cyanide.—100% basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton ; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 20s. 1d. per lb. in 28 lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £123 ton.

Sodium Metasilicate.—£22 15s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98%, 6-ton lots, d/d station, £28 10s. per ton.

Sodium Nitrite.—£31 for 1 ton lots.

Sodium Percarbonate.—12½% available oxygen, £8 8s. 4½d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £37 10s., anhydrous, £78 10s. ; tri-sodium, crystalline, £39 10s., anhydrous, £75 10s.

Sodium Prussiate.—10d. to 10½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber's Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground, £6 per ton d/d station in bulk. MANCHESTER : £7 per ton d/d station.

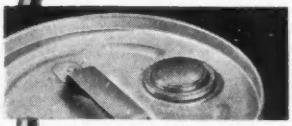
Sodium Sulphide.—Solid, 60/62%, spot, £30 per ton, d/d, in drums ; broken, £30 15s. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £59 per ton ; pea crystals, £37 12s. 6d. per ton d/d station in kegs ; commercial, £23 7s. 6d. per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £22 16s. 6d. to £25 6s. according to fineness.

WHY THE FLEXSPOUT helps sell any product sold in steel drums

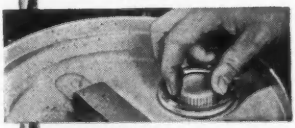
UP TO 12½ GALLON CAPACITY



LEAKPROOF AND TAMPERPROOF— *One-piece moulded plastic, sealed directly on drum metal. Actually stronger than the container.*

EASY TO OPEN— *Without special tools. Nail, screwdriver or any sharp object is all that is necessary.*

FLEXIBLE POURING SPOUT— *Extends for easy pouring. Only inside of spout touches liquid. Enables contents to be emptied to last drop.*



RE-SEALS TIGHTLY— *With plastic screw cap. Protects volatile liquids. Spout retracts for easy stacking.*

FlexSpout simplifies filling, using, pouring and storing your liquid products.

FlexSpout is odourless, tasteless and non-toxic. It resists attack by almost all chemicals, solvents and oils. Easily applied with one stroke of a simple hand-tool, it permits faster filling and sealing. Lowers production costs. 2⅜" aperture aids filling. For a few pence a drum extra, it adds greatly to the sales appeal of your products.

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227 GRAND BUILDINGS,
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PLEASE POST US, FREE OF CHARGE, BROCHURE AND SAMPLE OF THE FLEXSPOUT CLOSURE

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R4081-C

Tartaric Acid.—Per cwt.: 10 cwt. or more, £12 5s.

Titanium Oxide.—Standard grade comm., with rutile structure £143 per ton; standard grade comm., £130 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d; white seal, £138 10s.; green seal, £137 10s.; red seal, £136.

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 3½d. to 3s. 1½d. per lb. Crimson, 3s. 4½d. to 4s. 5½d. per lb.

Carbon Bisulphide.—£65 5s. per ton, according to quality.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£74 10s. per ton.

India-rubber Substitutes.—White, 1s. 6½d. to 1s. 10½d. per lb.; dark, 1s. 4½d. to 1s. 8½d. per lb.

Lithopone.—30%, £60 per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, 'Rupron.'—£20 per ton.

Sulphur Chloride.—British 48s. 6d. per cwt.; Imported £120 per ton.

Vegetable Lamp Black.—£49 per ton

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £16 18s.

Compound Fertilisers.—Per ton in 6 ton lots, d/d farmer's nearest station, I.C.I. Special No. 1 £27 9s.

'Nitro-Chalk.'—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots d/d nearest station, £28 10s. per ton.

Coal-Tar Products

Benzole.—Per gal, ex works: 90's, 3s. 8½d.; pure, 3s. 11½d.; nitration grade, 4s. 2½d.

Carbolic Acid.—Crystals, 1s. 6d. to 1s. 8d. per lb. Crude, 60's, 8s. MANCHESTER: Crystals, 1s. 6d. to 1s. 8d. per lb., d/d crude, 8s. naked, at works.

Creosote.—Home trade, 10d. to 1s. 2d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 1s. to 1s. 8d. per gal.

Cresylic Acid.—Pale 99%, 5s. 8d. per gal.; 99.5/100%, 5s. 10d. American, duty free, for export, 5s. to 5s. 8d. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 10½d. per gal. for 1000-gal. lots; heavy, 90/190°, 4s. 3½d. per gal. for 1000-gal. lots, d/d. Drums extra: higher prices for smaller lots.

Naphthalene.—Crude, ton lots, in sellers' bags, £18 16s. 3d. to £34 per ton according to m.p.; hot-pressed, £50 to £60 per ton, in bulk ex works; purified crystals, £68 10s. to £79 3s. 4d. per ton.

Pitch.—Medium, soft, home trade, 130s. per ton f.o.r. suppliers' works; export trade, 200s. per ton f.o.b. suppliers' port. MANCHESTER: £8 f.o.r.

Pyridine.—90/160°, 42s. 6d. per gal. MANCHESTER: 42s. 6d. per gal.

Toluol.—Pure, 4s. 7½d. per gal. MANCHESTER: Pure, 4s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 6d. per gal., according to grade, d/d.

Intermediate and Dyes
(Prices Nominal)

***m*-Cresol 98/100%.**—3s. 9d. per lb. d/d.

***o*-Creso 30/31° C.**—1s. 4d. per lb. d/d.

***p*-Cresol 34/35° C.**—3s. 9d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

***p*-Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

***o*-Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—2s. 2d. per lb., in casks.

***m*-Xylidine Acetate.**—4s. 5d. per lb., 100%

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Chemical & Allied Stocks & Shares

ALTHOUGH stock markets have been firmer, business remained on a moderate scale, a waiting attitude prevailing pending the outcome of the Commonwealth conference and further news of the programme and policies of the new U.S. Government. The main point being discussed in the City is whether the Commonwealth conference will decide in favour of wider convertibility of the £. It is realised that in the early stages there might have to be special safeguards to prevent any large scale drain on our dollar reserves owing to foreign countries using their sterling balances to switch into dollars. Nevertheless, a measure of wider convertibility, it is believed in many quarters, would provide a big stimulus to trade of the sterling area; and if it is decided on, industrial shares, particularly those of the big exporting companies, would probably attract a good deal more attention in stock markets.

Sharp Fall Possible

Another query is whether commodity and metal prices will fall sharply in 1953. It is realised that much will depend on the policy of the U.S. and whether she decides to follow a programme of disinflation at home and at the same time reduce foreign aid. In contrast with a waiting attitude in most other sections, British Funds have shown renewed firmness, due in the main to the City view that income tax is likely to be reduced next year and that EPL may be modified. Moreover, there is also talk that the bank rate may be reduced during the next few months. These factors, if they develop, would of course mean lower yields and higher prices not only for gilt-edged stocks, but for fixed-interest securities generally.

Chemical and allied shares have given a firmer display as a result of the better tendency in markets generally. Fisons have been good with an advance to 31s. 9d. as a result of the raising of the dividend from 9 per cent to 10 per cent and the chairman's statement indicating confidence in the trend in demand for fertilisers. Imperial Chemical were more active around 44s. 3d. and as usual, moved closely with the day-to-day trend of stock markets. Albright & Wilson 5s. shares at 15s. 3d. have been firm again on higher dividend hopes, Monsanto Chemical 5s. shares were little changed on balance at 24s.; and Laporte Chemical 5s. shares were well maintained at 11s. 4½d., following the directors' decision to ask shareholders' approval to increase borrowing powers from £1,600,000 to £3,500,000 as a prelude to raising new capital.

Brotherton 10s. shares held steady at 22s. 4½d., W. J. Bush were 45s., while Hickson & Welch strengthened to 9s. 9d., and Eaglescliffe 5s. shares to 16s. 6d. Boake, Roberts 5s. shares held firm at 13s. 9d., and Reichhold Chemical 5s. shares changed hands around 8s. 9d. In other directions, John & James White 5s. shares were 11s. 9d., Sanitas Trust 10s. shares 14s. 9d., Pest Control 5s. shares 4s. 3d., Bowmans Chemicals 4s. shares were quoted at 2s. 6d., and Amber Chemical 2s. shares were 1s. A good feature was provided by an advance in the 5s. shares of Greeff Chemicals Holdings to 17s., which compares with 15s. 3d. a month ago. L. B. Holliday 4½ per cent preference were 15s. 9d. William Blythe 3s. shares were quoted at 10s., and Borax Consolidated at 36s. 9d.

The 4s. units of the Distillers Co. were well maintained at 17s., United Molasses, after easing, firmed up to 28s. 9d., Turner & Newall have been active around 95s. on higher dividend hopes, Unilever were 46s. 6d., but paint shares became easier on recent dividends and trade reports indicating increased competition and lower profit margins in the paint industry. Lewis Berger 4s. units were 10s., but Goodlass Wall 10s. units at 20s. 9d. have been a firm feature on attention drawn to the potentialities of the company's 30 per cent interest in British Titan Products. British Oxygen held steady at 49s. 4½d. on the new issue terms. United Glass Bottle however eased to 72s. 6d. on the company's capital increase. Triplex Glass 10s. shares kept at 20s. 3d.

Easier Trend in Oils

Among oils there has been an easier trend with Shell 75s. 7½d., and Anglo-Iranian £5⅞. In the plastics section, De La Rue have come back sharply to 8s. 6d. while O. & M. Kleemann were 6s. 10½d. on the results and British Industrial Plastics 2s. shares were quoted at 4s. following the company's report on current trading conditions.

DRUM ROTARY PISTON PUMP

PHOTOGRAPHIC COMPETITION

OPEN TO EVERYBODY

'Drum' Pumps are in use for many different purposes in all parts of the world, and we are sure that many of these installations would make good photographs. To arouse the interest of engineers and others who have charge of 'Drum' Pumps, The "Drum" Engineering Co., Ltd., has pleasure in announcing a Photographic Competition, to be held in two sections: 'Home' (for those residing in U.K.) and 'Overseas' (for those residing abroad).

FIRST PRIZE . . . £25
SECOND PRIZE . . £10
THIRD PRIZE . . . £5

(1st, 2nd and 3rd Prizes will be awarded separately in the 'Home' and 'Overseas' Competitions).

In addition, One Guinea (£1 1s.) will be awarded for each photograph of sufficient interest to be retained for use by The "Drum" Engineering Co., Ltd.

The subject of the Competition will be 'DRUM' PUMPS IN USE. The basis of the awards will be good clear photography of technical interest, rather than 'artistic' presentation. It is desired to keep the Competition as informal as possible, but the following conditions shall be considered as binding on competitors:

1. Prints submitted to be black and white, and preferably not smaller than 4 in. x 3 in.

2. Prints to be well-packed and sent marked 'Photographic Competition' to The "Drum" Engineering Co., Ltd., Bradford, Yorkshire, England.

3. On the back of each print must be *pasted a label* bearing the name and address of the competitor (together with a pseudonym if desired) and a description of the photograph. Any interesting data regarding the pump can also appear on this label, which should be written or typed *before* being attached to the print. Do not write or type on the print itself.

4. The "Drum" Engineering Co., Ltd., may wish to reproduce photographs for which an award has been made; in such cases the Company will seek from the user of the pump(s) written permission to reproduce.

5. No print submitted can in any circumstances be returned.

6. Where permission to photograph is necessary, suitable permission must be secured *by the competitor* before submitting any print.

7. The names (or pseudonyms) of the winners will be published in this journal; the decision of the Managing Director of The "Drum" Engineering Co., Ltd., shall be final.

8. CLOSING DATES:
'Home' Competition
31st January, 1953.
'Overseas' Competition
31st March, 1953.

THE "DRUM" ENGINEERING COMPANY LTD.
HUMBOLDT STREET, BRADFORD, ENGLAND

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

ASSISTANT ENGINEER required as Technical Sales Engineer by Chemical Engineering Firm in London. Age under 30. Good knowledge of Physics and Heat Transfer essential. Understanding of Chemistry and practical works' experience desirable. The position is pensionable and offers excellent opportunities. Write, stating age, qualifications, salary required, to **BOX No. C.A. 3181, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

A VACANCY occurs on the Editorial Staff of **THE CHEMICAL AGE** for a **SUB-EDITOR-REPORTER** who has had some experience in Chemical Engineering and Industrial Chemistry. Shorthand desirable but not essential. Applications, in writing, stating full details of experience, and salary expected, to the **MANAGING DIRECTOR, "THE CHEMICAL AGE," 154, FLEET STREET, LONDON, E.C.4.**

TECHNICAL ASSISTANT, aged 20-25, possessing InterB.Sc. or Higher Schools Certificate, or the equivalent of these, with credits in Chemistry, Physics and Mathematics, wanted for Analytical and/or Process and Product Development work at a petroleum research station near London. Applicants should have had some previous technical experience, preferably of the petroleum industry, although this is not essential. Salary according to age, qualifications and experience. Write, giving full details and quoting Dept. M.1910, to **BOX 6342, c/o 191, GRESHAM HOUSE, LONDON, E.C.2.**

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600

CHEMICAL PLANT

CREAM MIXING UNIT by Pfaudler, comprising 2 S.J. Glass-lined Vessels, each 1 ft. 1 in. diam. by 3 ft. deep, with bottom outlets discharging to S.J. Glass-lined Mixer 30 in. diam. by 36 in. deep, Stainless Steel Agitator, motorised A.C., through gearbox. Unit mounted in steel staging with access ladder. Complete with all valves, piping, etc.

4—**SIFTER MIXERS** by Young. M.S. Mixing Trough, 64 in. by 21 in. by 22 in. deep. Blending chamber feeds material to positive action brush sifter. F. and L. pulley drive.

Vertical **COPPER STILL,** 6 ft. diam. by 6 ft. deep, on straight with domed top and concave bottom. 18 in. bolted cover on top. Bolted manhole cover in centre of side. Fitted L.P. 2½ in. diam. steam coil, 4 ft. p.c.d., 7 turns. Fractionating column, 15 ft. by 1 ft. 9 in. diam. of copper construction and contains 30 trays.

Pfaudler 150-gal. Vertical **GLASS-LINED STILL.** Steam jacket, 30 lb. pressure. Bolted cover has 6 in. by 7 ft. 6 in. high, 3-section glass-lined column with 2 in. diam. take-off pipe.

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WOOD LANE, LONDON, W.12,
Tel.: Shepherds Bush 2070, and
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CHARCOAL, ANIMAL AND VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal-insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—**THOS. HILL-JONES LTD., "INVICTA" MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON," TELEPHONE 3285 EAST.**

ECONOMIC BOILERS—9 ft. diam. by 12 ft. 6 in. Foster Yates, 200 lb. w.p.; 8 ft. diam. by 14 ft. Paxman, 180 lb. w.p.

NEW GALVANISED PIPING. Immediate delivery. Johnson Filter **PRESSES,** 25 in., 18 Frame, practically new.

FIVE new **FURNACE RETORTS,** 8 ft. diam., 6 ft. 8 in. deep, approx 8 tons each. Welded Steel.

BENZOLE WASHER, lead lined, agitating gear, 7 ft diam., 6 ft. 6 in. deep.

FIVE Dish-ended **NAPHTHA TANKS,** 18 ft. 6 in. long by 4 ft. 4 in. diam., two having agitators

NINE New Welded **TANKS,** 13 ft. 6 in. long, 7 ft. diam., 3,100 gallons each.

TWO 35 ft. long by 9 ft. diam. Lead-lined **TANKS.**

Stainless Steel **FILTER TANK,** 3 ft. 6 in. diam.

ONE Stainless **CONICAL HOPPER,** 7 ft. 3 in. diam., overall depth, 7 ft. 6 in.

TWO Broadbent **WATER-DRIVEN CENTRIFUGES,** 30 in diam., 12 in. deep, 1,150 r.p.m., 150 lb. pressure.

FOUR Papier-mache **O.T. TANKS,** 8 ft. 3 in. diam., 9 ft. deep. (Unused.)

SIX **O.T. TANKS,** 7 ft. diam. 14ft. deep, lined inside with acid-resisting bricks

SIX Aluminium **CONDENSERS,** 14 ft. long by 2 ft. 6 in. diam. 386 Tubes, ¾ in. o.d.

FOUR Rectangular Lead-lined **TANKS,** 8 ft. by 4 ft. 6 in. by 2 ft. 6 in.

FORTY Riveted **RECEIVERS,** 8 ft. 6 in. long, 5 ft. 6 in. diam., 75 lbs. w.p.

CAST-IRON PIPES, 5000 ft. Each 6 in. and 8 in.

VALVES in Stainless, Gunmetal, Enamel Lined.

Free Catalogue, "Watkins Machinery Record," available.

FRED WATKINS, COLEFORD, GLOS.

FURFURAL: Regular supplies from early next year available. Consumers only, please write **BOX No. C.A. 3183, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

GRAVITY Roller Conveyor several lengths, Rolls. 2½ in. diam. by 16 in. 3 in. centres. Good condition. **THOMPSON & SON (MILLWALL), LIMITED, CUBA STREET MILLWALL E.14.** (Tel.: East 1844.)

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HEAVY DUTY WERNER DOUBLE 'Z' MIXER, 45 in. by 39 in. by 31 in. deep. Double Geared. Adjustable Packed Glands. Self-motorised Electric Tilting. Another similar 39 in. by 33 in. by 28 in. deep. Fully reconditioned.

WINKWORTH MACHINERY,
65, HIGH STREET STAINES.
Telephone 1010.

MANESTY Rotary, model D3A, 16 punch, available in January. New August last. Perfect condition, can be inspected working. Reply to **TOPCROFT, STANDON, HERTS.**

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HYDRO EXTRACTORS
By **BROADBENT,** all electric, underdriven :
ONE 48 in. pitless, 3-point suspension, steel galvanised basket, lift-out type.
ONE 48 in. pit type, 3-point suspension, steel galvanised basket.
ONE 48 in. pit type, 4-point suspension, stainless steel imperforate basket, complete with skimming attachment, A.C. or D.C.
ONE 60 in. pit type, 3-point suspension, steel galvanised basket.
ONE 72 in. pit and **ONE** 72 in. pitless type, 3-point suspension, steel galvanised baskets.

By **WATSON LAIDLAW** :
TWO 42 in., 3-point suspension, underdriven through Vee ropes from flange-mounted vertical spindle motor.

By **MANLOVE ALLIOTT** :
ONE 21 in., imperforate conical basket, 21 in. tapering to 12 in. at bottom. Underdriven through flat belt fron flange-mounted vertical spindle, 2 h.p. motor.

By **BROADBENT** (steam driven) :
ONE 48 in., 3-point suspension, lead lined throughout and ebonite-lined basket.

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JACKETED BOILING PANS
NEW and available for immediate delivery :
100 gallon welded construction, mounted on three legs and certified for 100 lb. p.s.i. w.p.
150 and 200 gallon, all welded, mounted on three legs and certified for 80 lb. p.s.i. w.p.

SECOND-HAND :
ONE 600 gallon totally enclosed **JACKETED AUTOCLAVE** with detachable top cover, of riveted construction, suitable for 1c0 lb. p.s.i. w.p. in jacket and 100 lb. w.p. internally.

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ONE 3 cwt. capacity **GARDNER TROUGH MIXER,** stainless steel lined trough and twin chrome-plated scroll blades mounted on stainless steel shaft. Fast and loose pulley drive.
Horizontal Churn-type **MIXING VESSELS** and Vertical Mixing Vessels, totally enclosed and open top in various sizes.
All types of **MIXING VESSELS** constructed to meet requirements.
ONE CHRISTY & NORRIS DISINTEGRATOR, size 00, arranged with worm and funnel feed.

CENTRIFUGES
ONE ALFA LAVAL, 150 g.p.h., with built-in geared pump, motorised.
ONE ALFA LAVAL, 150 g.p.h. laboratory type machine, motorised.
ONE SHARPLES Centrifuge, as new, motorised.
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3 JACKETED **INCORPORATORS,** double "Z" arms, double geared, power-driven tipping motion, with counterbalancing weights.
1—Baker Perkins **MIXER** as above, not steam jacketed, single geared, complete with 25 h.p. A.C. motor.
3—Baker Perkins and Werner Jacketed **MIXERS** screw tipping pattern, friction pulley drive, single geared, with double-fin type agitators.
4—Gardner **RAPID SIFTER MIXERS** and **MIXERS** only, various sizes, one with brass fitted interior and glass-lined end plates.
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1—Simon Horizontal Tubular **DRIER,** 12 ft. long, 100 lb. steam pressure, size 3B, requiring 12 b.h.p.
4—Recessed Plate **FILTER PRESSES,** 30 in. square, 70 plates in each, centre fed.
5—Johnson **FILTER PRESSES,** 24 in. square, side feed and enclosed delivery, fitted 29 plates and 30 frames.
1—Johnson **FILTER PRESS,** 36 in. square, plate and frame type, double inlet and enclosed delivery ports.
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Johnson Experimental **PRESS,** fitted 11 plates, 19 in. square, with feed pump, reduction gearbox and electric motor.
Steam-heated **FILTER PRESS,** Premier type, 32 in. square, with 30 recessed plates.
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48 in. Hydro **EXTRACTOR,** self-balancing, swan-neck type, self-emptying bottom.
2—30 in. Swan-neck **HYDROS.**
1—26 in. Swan-neck **HYDRO.**
Heavy Cake **CRUSHING MILL,** 2-pair high, by Nicholson, for cake up to 3 in. thick, rolls 30 in. long, top with coarse teeth 9 in. diam., bottom with finer teeth 12 in. diam.
5 Sets A.A. **CRUSHING ROLLS** for linseed, cotton seed, etc., 48 in. long, belt driven, with feed hopper, side frames, baseplate and striking gear.
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"U"-shaped Horizontal **MIXER,** 8 ft. long, 3 ft. wide, 3 ft. 3 in. deep, belt and gear driven, end outlet, square horizontal centre shaft with cast radial type mixing arms, last used for lineoleum paste.
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7 ft. Torrance Positive-driven **EDGE RUNNER,** 2 Vertical Paint Pug Mills, 2-bar Disc Paint Grinding Mills, and 2 Horizontal 40-gallon capacity Cox Pug Mills for paint.

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ENGINEERS,
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POWDER MIXER for sale, "Alite," Type G.M.; motor drive, 400/440/3/50. Capacity, 400 lb. Chamber, 58 in. by 23 in. by 27 in. deep, opening at bottom, 6 in. by 6 in. **F. J. EDWARDS, LTD., 359, EUSTON ROAD, LONDON.**

SCREENLESS PULVERIZERS for fine grinding of Chemicals. Also **CYCLONES, ROTARY VALVE FEEDERS. Callow (Engrs.) Ltd. Kirkby Trading Est., Liverpool.**

STAINLESS Steel F.D.P. quality ¼ in. thick plate welded construction horizontal cylindrical enclosed **STORAGE TANK,** 2,000 gallons capacity, 6 by 12 ft. long; manhole inlet and outlet connections. Further details, **BOX No. C.A. 3182, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

STORAGE VESSELS ALL WELDED

3—12 ft. dia. by 12 ft. deep with additional Cone Base 12 ft. dia. to 6 in. dia. 10 ft. deep. Capacity 11,000 gallons. ¾ in. Plate. Also Supporting Steelwork.

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30 CWT. CHAIN BLOCKS, 10 ft.-12 ft. lift, ex-Government surplus. £15 per set.

5 CAST-IRON JACKETED PANS, 36 in. diam. by 27 in. deep, 1½ in. bottom outlet. £20 each.

1 **MILD STEEL WELDED OPEN-TOP TANK,** 60 in. by 27 in. by 42 in. by ⅜ in. plate. £25.

THOMPSON & SON (MILLWALL), LTD.,
CUBA STREET, MILLWALL, E.14.
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24,000 GALLON Steel Sectional **TANKS,** 24 ft. by 20 ft. by 8 ft. deep.

4,000 gallon Welded (Unused) **TANKS,** 15 ft. by 7 ft. by 7 ft.

1,000 gallon Welded Petrol **TANKS** (two).

3,000 gallon **"BRAITHWAITE" SECTIONAL,** 12 ft. by 10 ft. by 4 ft.

1,250 gallon Welded. 2-compartment **VEHICLE TANK.**

BOILERS, PUMPS, STILLS, CONDENSERS, HYDROS, AUTOCLAVES, MIXERS, PANS, CONVEYORS, OVENS, DRYERS, ETC.

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HARRY H. GARDHAM & CO., LTD.,
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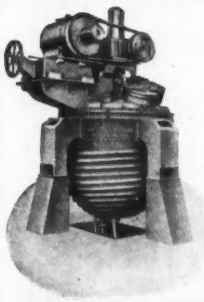

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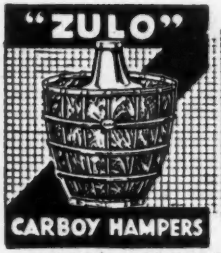

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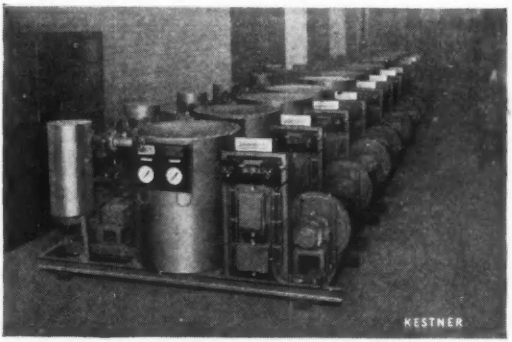

The illustration shows a batch of air dryers supplied for the maintenance of low humidity in ships.

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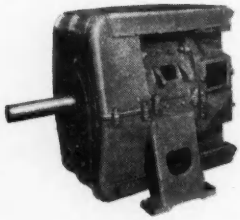

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